
2. PROJECT DESCRIPTION AND ALTERNATIVES

Chapter 2 begins with a brief summary description of the current and future support that the Los Alamos National Laboratory (LANL) analytical chemistry and materials characterization (AC and MC) capabilities are providing to the Stockpile Stewardship and Management (SSM) Program. It provides descriptions of the existing Chemistry and Metallurgy Research (CMR) Building and current AC and MC capabilities, as well as the proposed new Chemistry and Metallurgy Research Replacement Project (CMRR) Facility. The chapter includes a description of the reasonable alternatives, the alternatives considered and subsequently eliminated from detailed evaluation, the planning assumptions and bases for the analyses presented in the environmental impact statement (EIS), and the Preferred Alternative.

2.1 CURRENT AND FUTURE SUPPORT OF STOCKPILE STEWARDSHIP

LANL has been assigned a variety of science, research and development, and production missions that are critical to the accomplishment of the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) national security objectives, as reflected in the *Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (SSM PEIS)*; the Record of Decision of which was published in the *Federal Register (FR)* on December 26, 1996 (61 FR 68014). Specific LANL assignments for the foreseeable future include production of War-Reserve (WR) products, assessment and certification of the nuclear weapons stockpile, surveillance of WR components and weapons systems, ensuring safe and secure storage of strategic materials, and management of excess plutonium inventories. In addition, LANL also supports actinide¹ science missions ranging from the plutonium-238 heat-source program for the National Aeronautics and Space Administration (NASA) to arms control and technology development.

The capabilities needed to execute the NNSA and DOE missions require facilities at LANL that can be used to handle actinide metals and other radioactive materials in a safe and secure manner. Of primary importance are the facilities located within Technical Area (TA) 3 (primarily the CMR Building) and TA-55 (primarily the Plutonium Facility) that are used for processing, characterizing, and storing large quantities of special nuclear material (SNM). In addition, the DOE Record of Decision for the *SSM PEIS* indicates that the Plutonium Facility and the CMR Building will require increased SNM storage and handling capabilities to support the pit fabrication mission. The operations in these key facilities, along with those in several support facilities, are critical to the SSM mission and to critical programs supporting the DOE Offices of Science, Environmental Management, Nonproliferation and National Security, and Nuclear Energy, Science, and Technology.

¹Actinides are any of a series of elements with atomic numbers ranging from actinium-89 through lawrencium-103.

In January 1999, NNSA approved a strategy for managing risks at the CMR Building. This strategy recognized that the 50-year-old CMR Building could not continue its mission support at an acceptable level of risk to public and worker health and safety without operational restrictions. In addition, the strategy committed NNSA and the University of California (UC at LANL) to manage the facility to a planned end-of-life in or about the year 2010. Finally, it committed NNSA and UC at LANL to develop long-term facility and site plans to relocate CMR capabilities elsewhere in LANL, as necessary to maintain support of national security missions. Since this strategy was approved, CMR capabilities have been restricted substantially, both by planned NNSA actions and by unplanned facility outages that have included the operational loss of two of the eight wings of the CMR Building. With each year, additional CMR operations and capabilities are being restricted due to safety and security constraints. For example, the Security Category I SNM storage vault at the CMR Building has been reclassified to a Security Category III/IV storage vault, which limits material inventories. It is apparent that action is required immediately to ensure that LANL can maintain its support of critical national security missions. The CMRR project seeks to relocate and consolidate mission-critical CMR capabilities at LANL to ensure continuous support of NNSA SSM strategic objectives; these capabilities are necessary to support the current and future directed stockpile work and campaign activities at LANL beyond 2010. Given that such action is necessary, it is prudent to also establish any anticipated capabilities and capacities necessary for long-term mission support.

2.2 DESCRIPTION OF THE EXISTING CMR BUILDING

2.2.1 Overview

The CMR Building (Building 3-29) was designed and built within TA-3 as an actinide chemistry and metallurgy research facility (see **Figure 2-1**). The main corridor with seven wings was constructed between 1949 and 1952. In 1960, a new wing (Wing 9) was added for activities that must be performed in hot cells. The planned Wings 6 and 8 were never constructed. In 1986, an SNM storage vault was added underground. The three-story building now has eight wings (Wings 1, 2, 3, 4, 5, 7, 9 and an Administration Wing) connected by a spinal corridor, and contains a total of 550,000 square feet (51,097 square meters) of space. It is a multiple-user facility in which specific wings are associated with different activities and is now the only LANL facility with full capabilities for performing SNM AC and MC. The Plutonium Facility at TA-55 provides support to CMR in the areas of materials control and accountability, waste management, and SNM storage.

Waste treatment and pretreatment conducted within the CMR Building is designed to meet waste acceptance criteria for receiving waste management and disposal facilities, onsite or offsite. The aqueous waste from radioactive activities and other nonhazardous aqueous chemical wastes from the CMR Building are discharged from each wing into a network of drains specifically designated to transport waste solutions to the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 for treatment and disposal. The primary sources of radioactive inorganic waste at the CMR Building include laboratory sinks, duct washdown systems, and overflows and blowdowns from circulating chilled water systems.

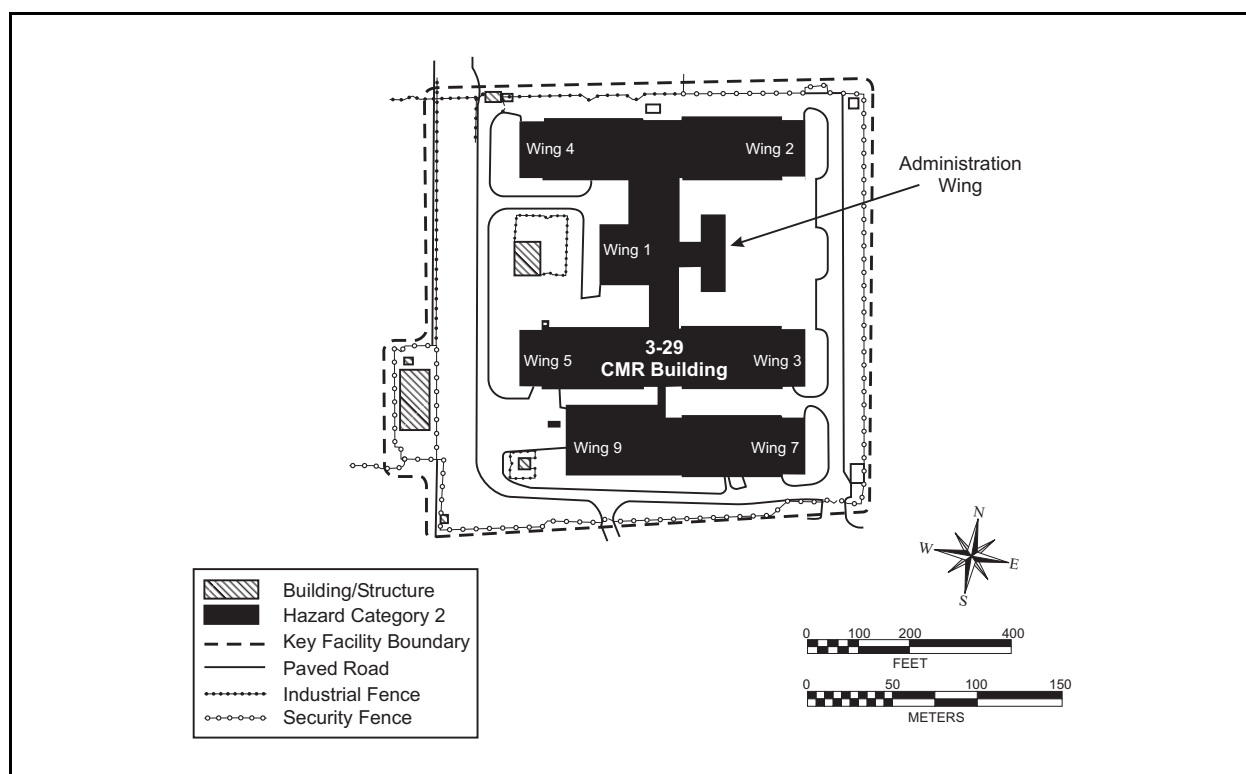


Figure 2–1 TA-3 Chemistry and Metallurgy Research Building

The CMR Building infrastructure is designed with air, temperature, and power systems that are operational nearly 100 percent of the time. Power to these systems is backed up with an uninterruptible power supply.

The CMR Building was constructed between 1949 and 1952 to the industrial building code standards in effect at that time. Over the intervening years, DOE has systematically identified and corrected some deficiencies and upgraded some systems to address changes in standards or improve safety performance. However, over time, the effects of facility aging combined with changes to safety codes, standards, and requirements have resulted in a situation where the building cannot be operated at levels required to meet mission requirements without restrictions to activities and limits on material inventories. Although completed upgrades to the CMR Building will allow for continued safe nuclear operations at an acceptable level of risk through 2010, it cannot be relied upon to meet long-term mission support requirements beyond that timeframe. Major upgrades to building structural and safety systems would be required to sustain nuclear operations. Furthermore, geologic studies and seismic investigations completed at LANL from 1996 through 1998 identified possible connections between several faults in the surrounding area that could increase the likelihood of fault rupture in TA-3 and beneath the CMR Building. Upgrades to the structure of the CMR Building to address seismic code requirements were identified as being cost prohibitive.

The CMR Building was originally designated as a Hazard Category 2, Security Category II facility under the criteria contained in DOE-STD-1027-92 and DOE Order 474.1-1A. The Security Category designation of a facility is determined by the type, quantity, and attractiveness

level of the material of concern. A Hazard Category 2 facility is defined as a nuclear facility for which a hazard analysis shows the potential for significant onsite consequences. As noted previously, NNSA and UC at LANL have restricted CMR Building operations and have reduced SNM quantities allowed within the Building. As a result, the CMR Building is currently operated as a Hazard Category 3, Security Category III facility. A Hazard Category 3 facility is designated as a nuclear facility for which a hazard analysis estimates the potential for only significant localized consequences.

2.2.2 Administrative Wing

The Administrative Wing and Wing 1 consist of individual office spaces, passageways, and conference rooms on three floors. Access to the CMR Building is through these wings and is controlled. The CMR Building Operations Center monitors all important system parameters and is housed in the Administration Wing.

2.2.3 Laboratories

Each CMR Building wing consists of basement, first, and second floors. Laboratory Wings 2, 3, 4, 5, and 7 consist of laboratory modules, passageways, office space, change rooms, and electrical and ventilation equipment rooms separated by interior walls. Change rooms are located on the first floor entrance to each wing. Radiological laboratory modules are located in the center of the first floor of the associated wing. Office spaces are typically located outside the laboratory modules, separated by passageways. Filter towers, which contain ventilation and electrical equipment rooms, are located at the end of each wing, opposite to the spinal corridor end of each wing. A large ventilation equipment room is located on the second floor of each wing adjoining the spinal corridor. Radiological labs contain gloveboxes and hoods required for individual processes. A radioactive liquid waste drainline system routes liquid waste from CMR Building laboratories to the RLWTF at TA-50.

2.2.4 Hot Cells (Wing 9)

Wing 9 consists of office spaces, change rooms, hydraulic plant spaces, laboratories, hot cells, and associated operating areas, radioactive material transfer area, machine shop, and floor well storage. Typically, utility service sources are located in the attic with service piping or conduit dropping down to the serviced spaces.

Hot cell operations include transferring materials between the high bay area and the hot cell corridors; loading and unloading of radioactive materials or sources from shipping or storage casks; unpackaging and packaging of radioactive materials, sources, or wastes; inspections; remote machining operations; remote welding operations; remote sample preparation; chemical processing; mechanical testing; or any similar remote handling operation. These operations also include maintenance and setup activities associated with the hot cells and corridors.

2.3 CMR CAPABILITIES

The operational CMR capabilities at LANL involve work with both radioactive and nonradioactive substances. Work involving radioactive material (including uranium-235, depleted uranium, thorium-231, plutonium-238, and plutonium-239) is performed inside specialized ventilation hoods, hot cells (enclosed, shielded areas that safely facilitate the remote manipulation of radioactive materials), and gloveboxes (enclosed areas with protective gloves that facilitate the safe handling of hazardous materials). Chemicals such as various acids, bases, and organic compounds are used in small quantities, generally in preparation of radioactive materials for processing or analysis.

The *Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory (LANL SWEIS)* described ongoing CMR Building capabilities at the time it was issued. Some of the capabilities are no longer performed at the CMR Building. The principal capabilities currently performed at the CMR Building are described below.

2.3.1 AC and MC

AC and MC capabilities in the CMR Building involve the study, evaluation, and analysis of radioactive materials. In general terms, analytical chemistry is that branch of chemistry that deals with the separation, identification, and determination of the components in a sample. Materials characterization relates to the measurement of basic material properties and the change in those properties as a function of temperature, pressure, or other factors. These activities support research and development associated with various nuclear materials programs, many of which are performed at other LANL locations on behalf of or in support of other sites across the DOE, NNSA complex (such as the Hanford Site, Savannah River Site, and Sandia National Laboratories). Sample characterization activities include assay and determination of isotopic ratios of plutonium, uranium, and other radioactive elements; identification of major and trace elements in materials; the content of gases; constituents at the surface of various materials; and methods to characterize waste constituents in hazardous and radioactive materials.

2.3.2 Destructive and Nondestructive Analysis

Destructive and nondestructive analysis employs analytical chemistry, metallographic analysis, measurement on the basis of neutron or gamma radiation from an item, and other measurement techniques. These activities are used in support of weapons quality, component surveillance, nuclear materials control and accountability, SNM standards development, research and development, environmental restoration, and waste treatment and disposal.

2.3.3 Actinide Research and Processing

Actinide research and processing at the CMR Building typically involves small quantities of solid and aqueous solutions. However, any research involving highly radioactive materials or remote handling may use the hot cells in Wing 9 of the CMR Building to minimize personnel exposure to radiation or other hazardous materials. CMR actinide research and processing may include separation of medical isotopes from targets, processing of neutron sources, and research

into the characteristics of materials, including the behavior or characteristics of materials in extreme environments such as high temperature or pressure.

2.3.4 Fabrication and Metallography

Fabrication and metallography at the CMR Building involves a variety of materials, including hazardous and nuclear materials. Much of this work is done with metallic uranium. A variety of parts, including targets, weapons components, and parts used for research and experimental tasks are fabricated and analyzed.

2.4 PROPOSED CMRR PROJECT CAPABILITIES

This section presents the elements of the operational capabilities proposed to be included within the CMRR project, those elements of existing capabilities housed within the CMR Building that are not planned to carryover into the CMRR project, and a description of the CMRR project alternatives analyzed in this *EIS for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory (CMRR EIS)*.

2.4.1 AC and MC Capabilities

These capabilities include the facility space and equipment needed to support nuclear operations, spectroscopic and analytical instrumentation, nonnuclear space and offices, and nonnuclear laboratory space for staging and testing equipment and experimental work with stable (nonradioactive) materials. Most of these capabilities are found at the CMR Building, although a subset of AC and MC capabilities reside in the TA-55 Plutonium Facility and other locations at LANL. This project element includes relocating all mission-essential CMR AC and MC capabilities and consolidation of AC and MC capabilities where possible to provide efficient and effective mission support.

2.4.2 AC and MC Capabilities Consolidated from the Plutonium Facility into the CMRR Facility

An appropriate amount of space and equipment for the purpose of relocating AC and MC research capabilities currently located within the Plutonium Facility at TA-55 into the new CMRR Facility would be provided as part of the proposed action. These capabilities would be sized consistent with the mission capacity requirements. At the present time, a set of these capabilities is provided within the Plutonium Facility to: (a) streamline material processes associated with pit fabrication and pit surveillance programs, and (b) minimize security costs and lost time associated with shipping large SNM items to the CMR Building from the Plutonium Facility.

2.4.3 SNM Storage Capability

An SNM storage capability would be provided sized to support CMRR Facility operations. The CMRR Facility storage capability would be designed to replace the current storage vault at the

CMR Building. The SNM storage requirements would be developed in conjunction with, and integrated into, a long-term LANL SNM storage strategy.

2.4.4 Large Containment Vessel Handling Capability

The CMRR Facility would provide large containment vessel handling capabilities in support of the Dynamic Experiments Program, including vessel cleanout and material recovery. These capabilities would be selected to complement the AC and MC capabilities already housed at the CMR Building, and the floor space occupied by these capabilities would be sized consistent with mission capacity requirements.

2.4.5 Mission Contingency Space

The CMRR Facility would be sized to include mission contingency space of approximately 30 percent net floor space for AC and MC operations. This mission contingency space would be available to accommodate future growth, expansion, or changes to existing capabilities. Hazard Category 2 or 3 nuclear facility construction typically requires large long-duration, high-cost projects that are not conducted on a regular routine basis by NNSA. Because new nuclear facility construction is not a routine process, mission contingency space is planned for CMRR to address minor changes in requirements that might occur over the duration of design and construction to accommodate future growth. Mission contingency space would not be equipped and made operational until required and would be subject to additional National Environmental Policy Act (NEPA) review.

2.4.6 Nuclear Materials Operational Capabilities and Space for non-LANL Users

This operational capability would provide research laboratory space for non-LANL users. Availability of research laboratory space within the CMRR Facility would be used by other NNSA and DOE nuclear sites to support Defense Programs related missions at LANL.

2.4.7 Existing CMR Capabilities and Activities Not Proposed for Inclusion within the New CMRR Facility

Not all capabilities either previously or currently performed within the existing CMR Building at LANL would be transferred into the new CMRR Facility. Such capabilities include the Wing 9 hot cell operations, medical isotope production, uranium production and surveillance activities, nonproliferation training, and other capabilities that are available elsewhere at DOE, NNSA sites other than at LANL. These capabilities could cease to exist at LANL, or could continue to exist within the existing CMR Building.

2.5 DESCRIPTION OF THE ACTION ALTERNATIVES

The *CMRR EIS* analyzes five main alternatives for the CMRR project. While the No Action Alternative does not meet NNSA's purpose and need for action, the other four alternatives analyzed were identified as reasonable alternatives for NNSA's proposed action.

No Action Alternative: Continued use of the existing CMR Building at TA-3 with minimal maintenance and component replacements to allow continued operations, although CMR operations would be restricted. No new buildings to support LANL AC and MC capabilities would be constructed.

Alternative 1: Construct a new CMRR Facility at LANL TA-55 (Preferred Alternative).

Alternative 2: Construct a new CMRR Facility within a “greenfield” site at LANL TA-6.

Alternative 3: Hybrid Alternative involving construction of a new CMRR Facility for SNM Laboratory(s) at LANL TA-55, with continued use of the existing CMR Building at TA-3 for administrative offices and support functions including “lite”² laboratories and other general activities.

Alternative 4: Hybrid Alternative involving construction of a new CMRR Facility for SNM Laboratory(s) at LANL TA-6, with continued use of existing CMR Building at TA-3 for administrative offices and support functions (including lite laboratories and other general activities).

For each of the above-listed alternatives involving new construction, there are four different construction options considered with respect to the CMRR Facility. These construction options are driven by the Security and Hazard Categorization for the portion of the CMRR Facility that would house operations involving SNM. Operations that use relatively large amounts (several grams per sample) of SNM, such as sample management and plutonium assay, require designated Hazard Category 2 facility(ies), which have structures, systems, and components appropriate for such operations. Operations that use smaller amounts of SNM (gram to microgram per sample) require designated Hazard Category 3 facility(ies), which use structures, systems and components appropriate for this kind of facility. Safeguards and security issues may require that any building designated as a Hazard Category 2 facility be located below ground (specifically, below the elevation level of the surrounding land). These facility hazard categorization and safeguards and security requirements drivers have resulted in the identification of the following construction options for the four action alternatives listed above:

Construction Option 1: Construct a separate nuclear SNM-capable Hazard Category 2 laboratory building and a separate Hazard Category 3 laboratory building above ground, with a separate building to house administrative offices and support functions (total of three buildings).

Construction Option 2: Construct a separate nuclear SNM-capable Hazard Category 2 laboratory building below ground, construct a Hazard Category 3 laboratory building above ground, with a separate building to house administrative offices and support functions (total of three buildings).

²The term “lite” is an informal, simplified spelling of the word “light.” In this context, the term “light” refers to occurring in small amounts, force, or intensity; specifically, the CMRR Facility lite laboratories would contain very small amounts of radioactive materials and nonradioactive materials and chemicals.

Construction Option 3: Construct a consolidated nuclear SNM-capable Hazard Category 2 laboratory above ground with a separate building to house administrative offices and support functions (total of two buildings).

Construction Option 4: Construct a consolidated nuclear SNM-capable Hazard Category 2 laboratory below ground with a separate building to house administrative offices and support functions (total of two buildings).

This EIS will also include an evaluation of environmental impacts that could result from construction of tunnels to connect the new buildings, SNM storage vaults, utility structures, security structures, and the construction of parking space for the occupants of the new CMRR Facility.

A more detailed description of the alternatives follows, and a more detailed description of the construction options is provided in Section 2.7.2.

2.5.1 No Action Alternative: Continued Use of Existing CMR Building – No New Building Construction

The No Action Alternative is to continue to use the existing CMR Building for SNM AC and MC operations, administrative support, office space, and lite laboratory functions. The CMR Building would receive minimal routine maintenance and limited component replacement, and repairs and no new buildings to support LANL AC and MC operations would be constructed. The CMR Building would continue to be operated as a Hazard Category 3, Security Category III facility, which limits the amount of SNM that can be used and the level of operations. These limitations do not currently support the level of operations required for the missions that NNSA has assigned to LANL through the *SSM PEIS* and *LANL SWEIS* Records of Decision.

2.5.2 Alternative 1 (the Preferred Alternative): Construct New CMRR Facility at TA-55

The Preferred Alternative is to construct two or three buildings at the TA-55 site for the CMRR Facility. Based on planning completed to date, facility hazard categorization, and the safeguards and security requirements described above, there are two potential CMRR Facility layout scenarios; a three-building scenario, and a two-building scenario.

Under the three-building scenario, a Hazard Category 2, Security Category I building and a Hazard Category 3, Security Category II building would be constructed within a Perimeter Intrusion and Detection Alarm System (PIDAS) fence. The existing TA-55 PIDAS would be extended to enclose the CMRR Hazard Category 2 and 3 buildings. The exact amount of PIDAS extension required is dependent on final site selection at TA-55 (see **Figure 2–2**). Primary electrical and water services would be extended from existing TA-55 services. Fire protection systems for CMRR would be developed and integrated with the TA-55 sitewide fire protection service.

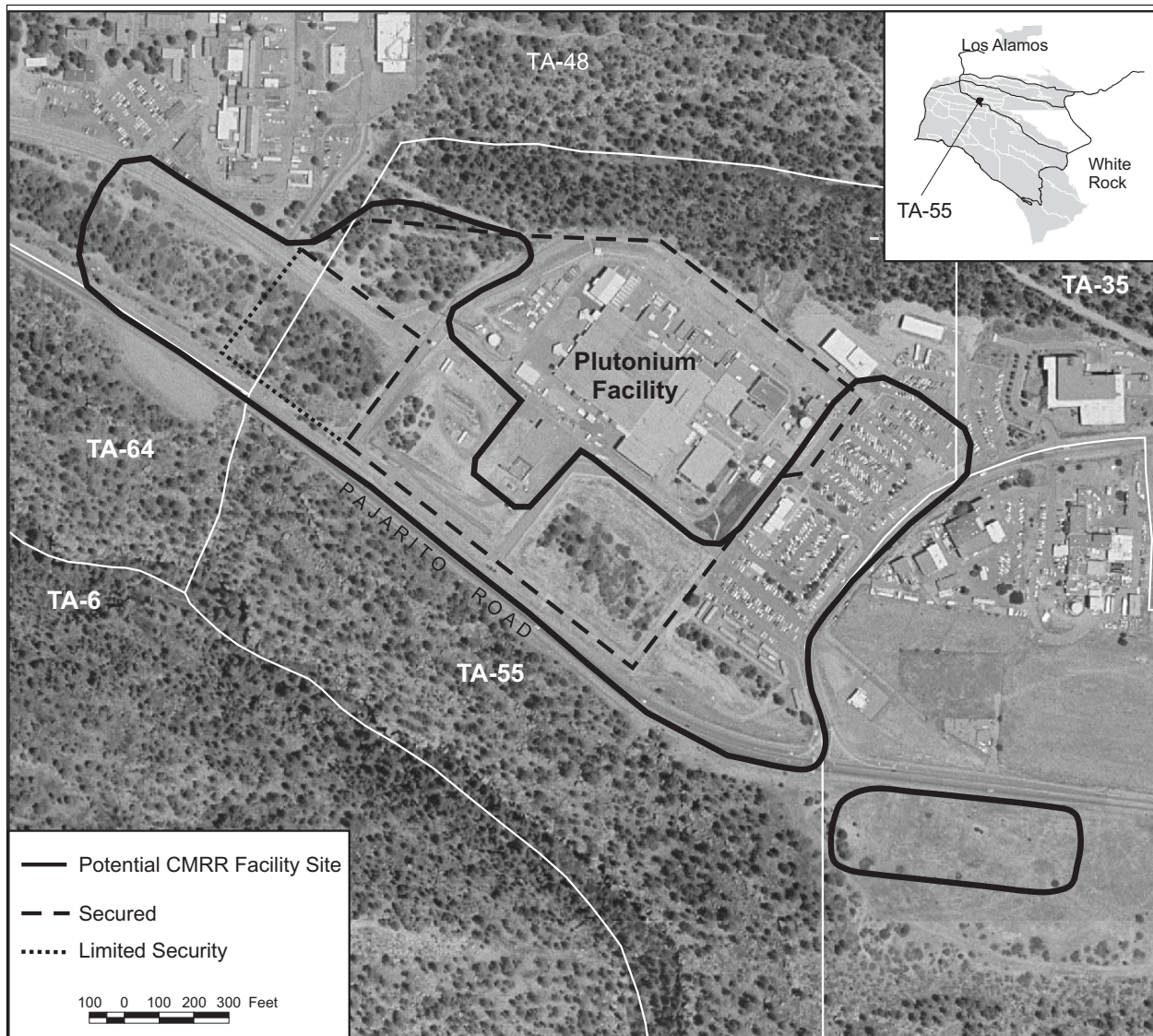


Figure 2-2 Plan View of Area Available for Future CMRR Facility at TA-55 Locations

The three-building scenario would be implemented with either Construction Option 1 or Construction Option 2. Under Construction Option 1, all three buildings would be built above ground with access between the buildings provided by aboveground walkways and doors, and also by underground access tunnels constructed to meet life-safety and appropriate security codes that would link the three buildings. The administrative offices and support functions building would be constructed and operated outside the PIDAS fence. This building would provide office and cafeteria space in addition to lite laboratory space used for such activities as glovebox mockup, process testing, chemical experimentation, training, and general research and development. The lite laboratory area(s) within this building would be allowed to contain only very small amounts of nuclear materials such that it would be designated a Radiological Facility.

The administrative offices and support functions building would be linked to the Hazard Category 3 laboratory building via the previously mentioned underground tunnel with its separate security station. The Hazard Category 2 laboratory building would in turn be linked to the Hazard Category 3 laboratory building through the underground tunnel; this would allow efficient transfer of samples from one building to the next. In addition, another underground tunnel would be constructed to connect the existing Plutonium Facility (Building 55-4) with the Hazard Category 2 building; this tunnel would also contain a vault spur for the CMRR Facility long-term SNM storage requirements.

The two-building scenario would be implemented with either Construction Option 3 or Construction Option 4. Under the two-building scenario, all nuclear AC and MC operations would be housed in one Hazard Category 2 nuclear laboratory building, and the administrative offices and support functions building would be the second building component. Tunnels and other features of the buildings and structures would be the same as those described for the three-building scenario, with some minor variation in locations and other features due to the differences in the location, size, and number of buildings constructed.

The location of the CMRR Facility within TA-55 would either be at the southeast corner of TA-55 near the intersection of Pajarito Road and Pecos Drive, at the west side of TA-55 between the Plutonium Facility and TA-48, or at the east side of TA-55 where the existing paved parking area is located. Construction of the CMRR Facility within TA-55 would eliminate or minimize the need for facility support space requirements for SNM shipping and receiving capabilities, as those functions would be conducted at the adjacent Plutonium Facility. Depending upon the exact location of the CMRR Facility within TA-55, some minor road realignment of Pecos Drive might be required.

Movement (transition) of operations from the existing CMR Building into the new CMRR Facility would be accomplished in carefully staged phases over a period of about 2 to 4 years, dependent on the final scope and schedule for CMRR Facility construction. During this transition period, both the new CMRR Facility and existing CMR Building would be operational.

The existing CMR Building would be dispositioned once all nuclear AC and MC operations and administrative support functions have been removed. Disposition could involve the renovation and reuse of the building for nonnuclear purposes (such as for administrative purposes, office spaces, and laboratory use involving nonnuclear work) together with the continued use of Wing 9 of the building for SNM hot cell work by non-Defense Program users. No definitive new building reuse purposes have been identified at this time; additional NEPA compliance review would be necessary when specific activities were identified for re-occupation and operation within the existing CMR Building. Disposition of the CMR Building could also result in demolition of the entire structure. A conceptual decommissioning and demolition of the CMR Building is discussed in Section 4.7.2 of this *CMRR EIS*.

2.5.3 Alternative 2 (Greenfield Site Alternative): Construct New CMRR Facility at TA-6

Alternative 2 is to construct the CMRR Facility at a “greenfield” location within Los Alamos National Laboratory. The proposed greenfield site is at TA-6, just south of the main technical area, TA-3. This site was identified as one that would be outside of necessary health and safety buffer zones associated with LANL explosives testing areas and other controlled operational sites, with most necessary utilities located nearby, and with appropriate access roads already available. **Figure 2–3** shows the TA-6 CMRR Facility site location.

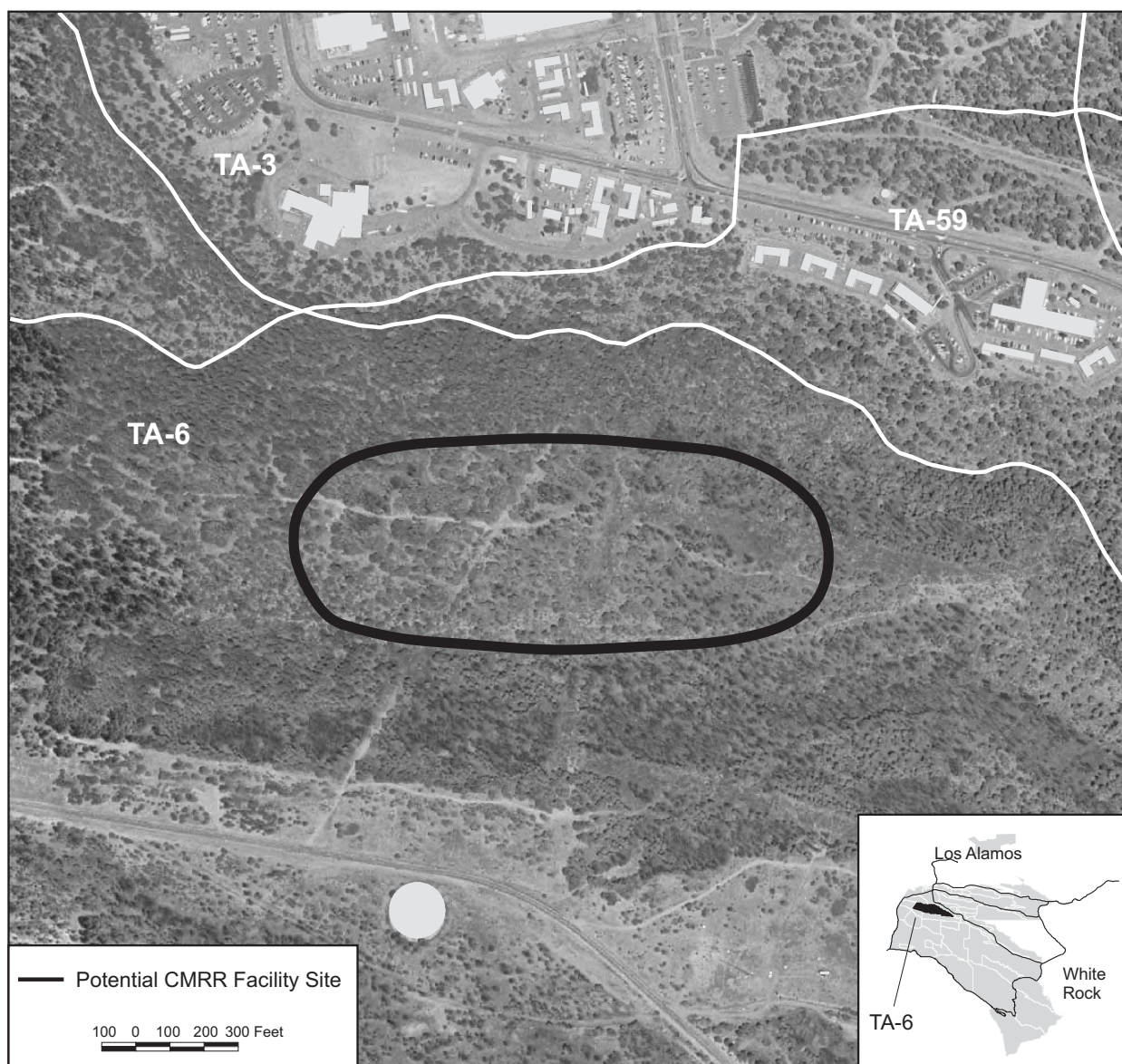


Figure 2–3 Plan View of Area Available for Future CMRR Facility at TA-6

In this “Greenfield” Alternative, the CMRR Facility layout would consist of a three-building or a two-building scenario as described for Alternative 1, with the same construction options. Access between the CMRR Facility buildings constructed at TA-6 could occur above or below ground

through an access tunnel. While laboratory space requirements would be the same as in Alternative 1, facility support space requirements such as shipping and receiving capabilities would need to be expanded under this alternative, due to the physical separation between the Plutonium Facility at TA-55 and the TA-6 proposed CMRR Facility site location. Shipping and receiving elements, as well as an SNM vault similar to those existing in the CMR Building, would be replicated. This alternative differs in this respect from Alternative 1. Additionally, because TA-6 is physically separated from TA-55, transportation of SNM (namely samples coming in and residues and wastes leaving) would cover greater distances than exist between the existing CMR Building and the Plutonium Facility.

The construction site would need utilities and services; about 1.5 acres (0.6 hectares) of trenching would be required for electric power service, communications lines, natural gas lines, potable water, and sewage services. A new permitted discharge to Pajarito Canyon would be required for stormwater runoff. Liquid radioactive wastes would be collected and contained onsite until transported by tanker truck or a new buried waste line to the TA-50 RLWTF for treatment and disposal. This new pipeline, potentially requiring about 3 acres (1.2 hectares) of trenching and disturbance, would be directionally drilled and placed beneath Two-Mile Canyon or suspended across the canyon reach to avoid exposure along the sides of the canyon and shallow burial across the canyon bottom. Other site wastes would be transported to appropriate waste treatment and disposal facilities at LANL or offsite. A short access road would need to be constructed that would require the disturbance of about 1.5 acres (0.6 hectares) of land.

A new security fence and PIDAS would need to be constructed around the buildings designated as Hazard Category 2 and 3 facilities. This PIDAS installation would be more extensive at the TA-6 location than a PIDAS extension of the existing system at TA-55, not only because of the additional fencing, but also because of the communications infrastructure required to transmit PIDAS information back to the central LANL security facility.

The transfer of CMR operations to the new CMRR Facility would be the same as described for Alternative 1, as would the decommissioning and disposition of the existing CMR Building.

2.5.4 Alternative 3 (Hybrid Alternative at TA-55): Construct New Hazard Category 2 and 3 SNM Laboratory Buildings (Above or Below Ground) at TA-55 and Continue Use of the CMR Building

An alternative to constructing the new administrative offices and support functions building portion of the CMRR Facility would be to continue use of the existing CMR Building for these functions, together with construction of the AC and MC building(s) at TA-55. This alternative differs from Alternatives 1 and 2 in that it retains the administrative offices and support functions of the CMRR Facility in the existing CMR Building at LANL.

Under this alternative, construction of new SNM-capable Hazard Category 2 and 3 building(s) would occur consistent with Alternative 1. As with the other Alternatives, there are four basic construction options driven by the facility hazard categorization and safeguards and security requirements.

The nuclear materials building(s) where SNM would be used would be constructed as described in Alternative 1, with a set of one Hazard Category 2 and one Hazard Category 3 buildings or with a single Hazard Category 2 building. These Hazard Categories 2 and 3 nuclear operations buildings would be the same size and have the same physical construction parameters as in Alternative 1.

The existing TA-55 security fence and PIDAS would be extended to encompass the building(s) designated as Hazard Category 2 or 3 facilities. No additional fencing or security measures would be needed for the existing CMR Building.

The administrative offices and support functions for the CMRR Facility would remain at the existing CMR Building at TA-3. As noted earlier in Section 2.2.1, upgrades would be required to the CMR Building's structural and safety systems in order to sustain nuclear capabilities there. Irrespective of upgrades required for nuclear operations, any future use of the existing CMR Building beyond 2010 would require repairs and upgrades to meet minimal structural and life safety code requirements. Seismic conditions beneath the existing CMR Building could preclude the use of wings 2 and 4, requiring that they be decommissioned and unoccupied once decommissioning was completed. Wing 9 would not be used for office or lite laboratory space. The existing administrative areas (Administration Wing and Wing 1) and Wings 3, 5, and 7 could be used for CMR administrative support, office space, and lite laboratory space (see **Figure 2-4**).

Operationally, Alternatives 3 and 4 (described later) are quite inefficient and costly because staff and technicians would have offices in a facility that is very remote from the CMRR Facility laboratories where most of their work would be performed. Additionally, not providing offices near the laboratories would probably decrease the capacity of the facility and would be a detriment to the employee quality of work life. Finally, one of the uses of the lite laboratory function in the CMRR Facility's administrative offices and support functions building would be to mock up and set up gloveboxes while they are still uncontaminated, to test equipment, prove-in procedures, and train on the new equipment prior to moving the gloveboxes into the nuclear facilities. Placing the lite laboratories in the existing CMR Building would severely hinder, if not prohibit, this use of the lite laboratories due to structural upgrade requirements, inadequate or incompatible ventilation system, and operational inefficiency created by the physical separation between TA-3 and TA-55 (and TA-6). Utilities, waste management, and security requirements would be the same as those described in Alternative 1, with the exception that utility service requirements would be fewer due to the administrative offices and support functions remaining within the existing CMR Building.

2.5.5 Alternative 4 (Hybrid Alternative at TA-6): Construct New Hazard Category 2 and 3 SNM Laboratories (Above or Below Ground) at TA-6 and Continue Use of the CMR Building

An alternative to constructing a new administrative offices and support functions building portion of the CMRR Facility would be to continue use of the existing CMR Building for these functions, together with construction of the AC and MC building(s) at TA-6. This alternative

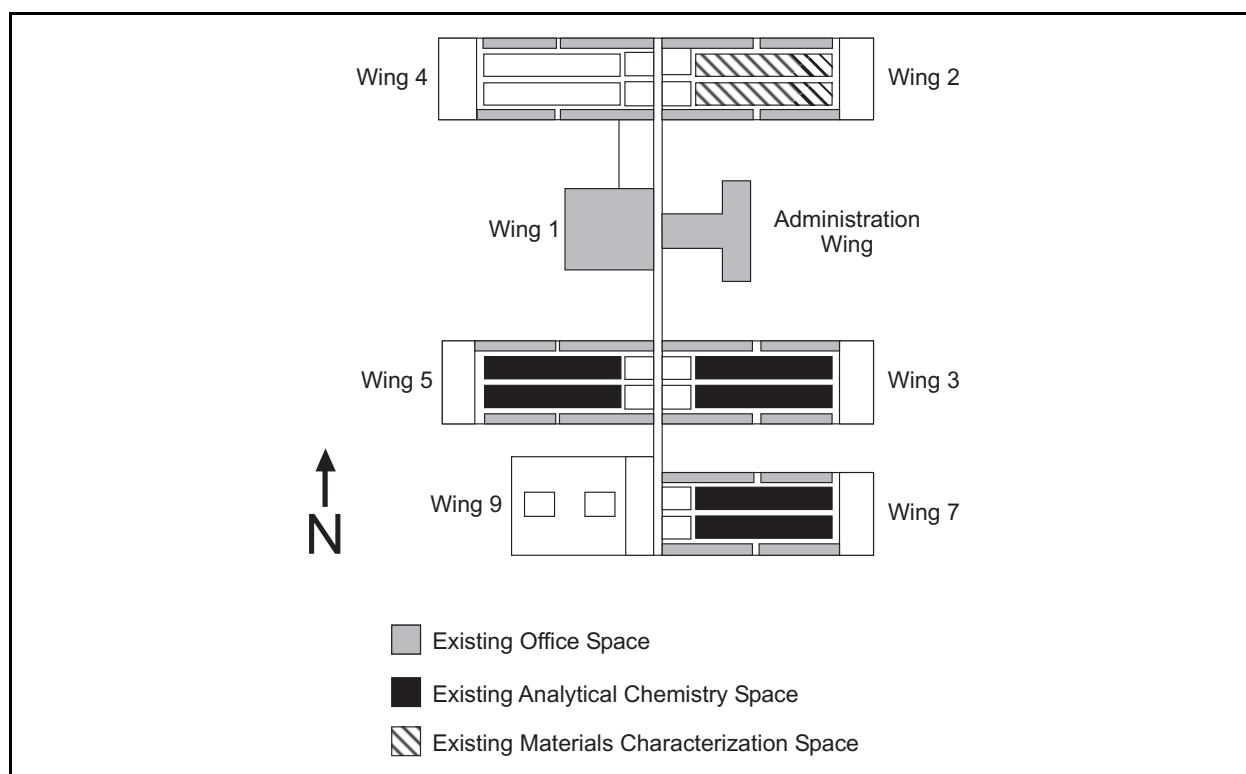


Figure 2-4 Simple Layout of Existing CMR Building

differs from Alternatives 1 and 2 in that it retains the administrative offices and support functions for the CMRR Facility in the existing CMR Building.

Under this alternative, construction of new SNM-capable Hazard Category 2 and 3 buildings would occur consistent with Alternative 2. As with the other alternatives, there are four basic construction options driven by the facility hazard categorization and safeguards and security requirements.

The nuclear materials building(s) where SNM would be used would be constructed as described for Alternative 2, with a single Hazard Category 2 building or a set of one Hazard Category 2 and one Hazard Category 3 building. These Hazard Category 2 and 3 nuclear operations buildings would be the same size and have the same physical construction parameters as in Alternative 2.

Utilities, waste management, and security requirements would be the same as those described in Alternative 2, with the exception that utility service requirements would be fewer due to the administrative offices and support functions remaining within the existing CMR Building.

Operationally, this alternative has the combined features of both Alternatives 2 and 3. The nuclear AC and MC operations would be physically segregated from their source of SNM, and personnel would be segregated from their laboratories. The alternative would also require additional construction for security fence and PIDAS installation and additional shipping and receiving capability requirements.

2.6 ALTERNATIVES CONSIDERED AND DISMISSED

2.6.1 Removing CMR Capabilities from LANL or Altering the Operational Level of Capabilities

The alternative of removing CMR capabilities from LANL or altering the operational level of these capabilities was considered and dismissed. As explained in Section 1.5, DOE considered the issue of maintaining CMR capabilities (along with other capabilities at LANL) in 1996 as part of the review of the SSM program and made programmatic decisions at that time that required the retention of CMR capabilities at LANL. In 1999, DOE concluded in the *LANL SWEIS* that, due to the lack of information on the proposal(s) for replacement of the CMR Building to provide for its continued operations and capabilities support, it was not the appropriate time to make specific decisions on the project. With the support of the *LANL SWEIS* impact analysis, however, DOE made a decision on the level of operations at LANL that included the level of operational capabilities housed by the CMR Building. Having made these critical decisions within the past 7 years, NNSA does not believe that it needs to revisit these decisions at this time related to the maintenance of CMR capabilities at LANL to support critical NNSA missions.

2.6.2 Considering the CMRR Project as Part of the “Integrated Nuclear Planning” Initiative at TA-55

The option of including the CMRR project environmental review as part of the so-called “Integrated Nuclear Planning” initiative for TA-55 was considered and dismissed. As discussed in Section 1.5, the various potential LANL Security Category I nuclear facilities are independent of one another in terms of their individual operations and the capabilities they house. The existing structures are of differing ages and, therefore, replacement of the aging structures would become necessary at different times. The construction of major facilities within a relatively tight geographic area would require that they be staggered so that the area can physically accommodate the necessary construction laydown sites and storage areas needed. The additional security elements required for the construction and startup of operations in Hazard Category 2 nuclear facilities also predicates the need for their separate construction in terms of schedule.

NNSA recently completed an EIS for relocating LANL’s TA-18 capabilities and materials and to move these particular capabilities and materials to another DOE site away from LANL and TA-55. NNSA is separately considering the construction and operation of a pit manufacturing facility on a scale greater than can currently be accommodated in existing facilities at LANL, and is considering TA-55 as a possible site. NNSA will eventually need to consider decisions on relocating or upgrading the aging TA-55 LANL Plutonium Facility, which is about 30 years old; however, any proposal for such a project is very speculative and not ready for decision at this time.

2.6.3 Alternative LANL Sites

The sites at TA-55 reflect NNSA's goal to bring all nuclear facilities within a nuclear core area. Siting of the CMRR Facility at TA-55 would colocate the AC and MC capabilities near the existing Plutonium Facility where the programs operations that require these capabilities are located.

The greenfield site at TA-6 was chosen using data and maps from the *2000 Comprehensive Site Plan* (LANL 2000f), the *Core Area Development Plan* and the *Anchor Ranch Area Development Plan* (LANL 2000g). These documents contain detailed development opportunity maps, which were developed using a set of siting criteria or constraints. Using geographic information system (GIS) processing software, a set of physical and operational constraints were scored, combined, and used to identify sitewide development opportunities. The physical constraints contained information regarding various topographic features, seismic fault lines, Federally-protected threatened and endangered species habitat information, floodplains, and wetlands locations. Also considered were surface hydrology, cultural resources, climate, vegetation, soils, and geology of LANL. The operational constraints considered locations of radiological sources, the White Rock Canyon Reserve, solid waste landfill, hazardous waste sites, range of radio frequencies, and airspace and blast buffer zones. The screening results are documented on a set of sitewide development opportunities maps found within these three documents. These documents also contain summary planning maps that reflect existing land uses as well as undeveloped (so called "greenfield") lands. Combining the development opportunities maps and summary maps allows identification of potential greenfield sites that would be suitable for siting CMRR Facility building(s). The final siting step for locating the CMRR Facility outside of TA-55 was to consider NNSA's desire to bring all nuclear facilities within a nuclear core area; TA-6 is the only greenfield site available for consideration in the general area of TA-55.

2.6.4 Extensive Upgrades to the Existing CMR Building for Use Beyond 2010

The proposal to complete extensive upgrades to the existing CMR Building's structural and safety systems to meet current mission support requirements for the suite of capabilities that exist in the Building today for another 20 to 30 years of operations was considered and evaluated by DOE and UC at LANL in the 1998 to 1999 timeframe. This approach to maintaining these mission-critical nuclear support capabilities would require a capital investment in excess of several hundred million dollars for just two wings of the CMR Building. The cost of upgrading the entire structure would be the same or more for constructing the proposed CMRR Facility. Implementing this alternative would not reduce the overall footprint of the CMR Building, which is costly to maintain and operate in part due to the amount of wasted space incorporated into its design, nor would it change the underpinning seismic condition of the CMR Building. Additionally, implementing this alternative would not allow for the consolidation of like activities presently located within the Plutonium Facility into one facility. This alternative was not considered to be reasonable to meet NNSA's purpose and need for action.

2.7 PLANNING INFORMATION AND BASES FOR ANALYSES

This *CMRR EIS* evaluates the potential direct, indirect, and cumulative environmental impacts that could result from relocating existing AC and MC capabilities currently residing in the CMR Building to new facilities at different locations at LANL. This involves: (1) the construction of new facilities with several construction options; (2) the relocation of materials and equipment from the existing CMR Building to new facilities; (3) the operation of new facilities for their design lifetime, following a transition period during which operations would be gradually transferred to the new facilities; (4) transportation of SNM (namely samples coming in and residues and wastes returning) between the Plutonium Facility at TA-55 and the new CMRR Facility; and (5) the disposition of the existing CMR Building. The operational characteristics for the CMRR Facility are based on the level of CMR Building operations identified by the Expanded Operations Alternative in the 1999 *LANL SWEIS*. Some of the more specific information and considerations that form the bases of the analyses and impact assessments in the *CMRR EIS* are presented below.

2.7.1 No Action Alternative

As required by Council on Environmental Quality (CEQ) regulations, the *CMRR EIS* evaluates a No Action Alternative for comparison purposes. This alternative reflects the decisions reached by DOE for operations within the CMR Building described in the Record of Decision for the *LANL SWEIS*. No new construction under the No Action Alternative would be initiated.

The impacts associated with the No Action Alternative for each resource area consider the current level of CMR operations and capabilities that are currently restricted to a minimal level, as discussed in Section 2.5.1.

2.7.2 Construction Options

The new buildings proposed for the CMRR project are currently in the conceptual design stage and, as a result, are not described in great detail in this EIS. However, to support the EIS analysis, conservative information has been used such that construction requirements and operational characteristics of these buildings bound the environmental impacts. Thus, the potential impacts from implementation of the finalized design would be expected to be less severe than those analyzed in the *CMRR EIS*.

For each alternative involving new construction, four different construction options were considered for the Hazard Category 2, Hazard Category 3, and administrative offices and support functions buildings. These options are driven by facility hazard and security categorizations for the portion of the CMRR Facility that would conduct operations involving SNM. In addition, and common to all options, is the construction of tunnels to connect the new buildings, SNM storage vault(s), utility structures, security structures, and the construction of parking space for the occupants of the new CMRR Facility.

Construction Option 1: For the purpose of this EIS analysis, Construction Option 1 was considered to be the option that would bound the potential environmental impacts resulting from construction activities. Thus, Construction Option 1 is the reference case for estimating the impacts for all action alternatives. This construction option includes separate SNM-capable Hazard Category 2 and 3 laboratories constructed above ground with a separate administrative offices and support functions building also constructed above ground. The requirements for each facility are as follows:

- **Hazard Category 2 Building:** Total square footage of approximately 100,000 square feet (9,290 square meters), with total disturbed construction site of approximately 2.5 acres (1 hectare). The maximum depth of excavation for construction would be no more than 50 feet (15.2 meters).
- **Hazard Category 3 Building:** Total square footage of approximately 100,000 square feet (9,290 square meters), with total disturbed construction site of approximately 2.25 acres (0.9 hectares). The maximum depth of excavation for construction would be no more than 50 feet (15.2 meters).
- **Administrative Offices and Support Functions Building:** Total square footage of approximately 200,000 square feet (18,580 square meters) dispersed over several stories, with a total disturbed construction site of approximately 4.0 acres (1.6 hectares). One or more floors could be constructed below ground with a maximum depth of excavation approximately 50 feet (15.2 meters). The building would contain a lite laboratory capable of handling materials up to a Hazard Category designation of Radiological Facility (less than 8.4 grams of plutonium-239 equivalent radioactive material), and would also include a utility structure housing utility equipment and services for all elements of the CMRR Facility. This utility structure would house power, hot water, heat, sanitary sewer, and chilled water services for the entire CMRR Facility. The utility structure [approximately 25,000 square feet (2,323 square meters)] is included in the total estimated square footage for the administrative offices and support functions building. This building aboveground would be a maximum height of three stories, or approximately 35 feet (10.7 meters) aboveground level.

In implementing this construction option with either Alternative 1 (Preferred Alternative) or Alternative 3, connecting tunnels would be constructed. These tunnels would be used for belowground linkage of the CMRR Facility as well as linkage with the Plutonium Facility at TA-55. In Alternative 1, the estimated length of tunnels would be approximately 1,200 feet (366 meters), and depth of excavations would be no more than 50 feet (15 meters). In Alternative 3, the estimated length of tunnels would be approximately 750 feet (229 meters), with a depth of excavation of approximately 50 feet (15 meters). These tunnels would be constructed utilizing cut-and-cover construction methods requiring specialized safety, security, and waterproofing methods. Alternatives 2 and 4 would require slightly larger facility support space requirements for such capabilities as shipping and receiving of materials into and out of the CMRR Facility. This space would be no more than one percent of the total 200,000 square foot (18,580 square meters) total.

Construction Option 2: This construction option includes the same building elements as Construction Option 1, with the exception that the SNM-Capable Hazard Category 2 building would be constructed below grade. For the Hazard Category 2 building, the maximum depth of excavation would increase to approximately 75 feet (23 meters). Excavated materials would be stockpiled onsite and would be used for regrading and constructing berms for the PIDAS around the facility. All other assumptions for the Hazard Category 3 and the administrative offices and support functions building would be the same as described in Construction Option 1.

Construction Option 3: This construction option includes a single consolidated SNM-capable Hazard Category 2 laboratory and a separate administrative offices and support functions building.

In this option, all Hazard Category 2 and 3 operations would be housed in the single Hazard Category 2 laboratory. The Hazard Category 2 building would contain a total of approximately 200,000 square feet (18,580 square meters) and be constructed with one floor below grade containing the Hazard Category 2 operations, and one floor above grade containing Hazard Category 3 operations. All assumptions for the administrative offices and support functions building would be the same as described in Construction Option 1.

In implementing this construction option with Alternatives 1 and 3 (at TA-55), connecting tunnels between the CMRR Facility and the Plutonium Facility would be excavated to a maximum depth of 50 feet (15 meters), with the estimated total length of tunnels approximately 1,200 feet (366 meters) for Alternative 1, and 500 feet (152 meters) for Alternative 3.

Construction Option 4: This option includes a single consolidated SNM-capable Hazard Category 2 laboratory constructed below grade and a separate administrative offices and support functions building.

As with Construction Option 3, all Hazard Category 2 and 3 operations would be housed in the single Hazard Category 2 laboratory constructed below grade. Maximum depth of excavation would be 75 feet (23 meters). All assumptions for the administrative offices and support functions building would be the same as described in Construction Option 1. Assumptions with respect to the connecting tunnels between facility elements would be the same as Construction Option 3.

General Construction Requirements for All Construction Options: Construction methods and materials employed on the CMRR project would be typical conventional light³-industrial for the administrative offices and support functions building and heavy-industrial, nuclear facility construction for the CMRR project nuclear laboratory elements. Information that is common to all the construction activities encompassed by the four construction options and four action alternatives is presented in the following paragraphs. A summary of construction requirements is presented in **Table 2–1**.

³Light industry refers to the use of small-scale construction machinery.

All construction work would be planned, managed, and performed to ensure that standard worker safety goals are met. All work would be performed in accordance with good management practices, with regulations promulgated by the Occupational Safety and Health Administration, and in accordance with various DOE Orders involving worker and site safety practices. To prevent serious injuries, all site workers (including contractors and subcontractors) would be required to submit and adhere to a Construction Safety and Health Plan. This Plan would be reviewed by UC at LANL staff before construction activities begin. Following approval of this Plan, UC and NNSA site inspectors would routinely verify that construction contractors and subcontractors were adhering to the Plan, including all Federal and state health and safety standards.

Table 2–1 Summary of CMRR Construction Requirements

<i>Building/Material Usage</i>	<i>Hazard Category 2 Building</i>	<i>Hazard Category 3 Building</i>	<i>Administrative Offices and Support Functions Building</i>	<i>Other Construction Elements</i>
Land (acres)	2.5	2.25	4.0	18 ^a
Water (gallons)	757,300	670,500	1,354,500	963,000
Electricity (megawatt-hours)	88.75	88.75	135	Not applicable
Concrete (cubic meters)	1,375	1,067	2,340	Not applicable
Steel (metric tons)	136	106	265	Not applicable
Peak construction workers	300			
Waste (nonhazardous) (metric tons)	130	99	295	10
Construction period (months)	17	17	26	6

Source: LANL 2002e.

^a The land affected by other construction elements would include: parking (5 acres), laydown area (2 acres), concrete batch plant (5 acres) at either TA-55 or TA-6. Additionally 6 acres of land would be affected at TA-55 due to road realignment. An equal area (6 acres) at TA-6 would be affected for extensive trenching for utilities (1.5 acres), radioactive liquid waste pipeline (3 acres), and new road (1.5 acres).

Site preparation prior to the commencement of building construction at either the TA-55 site or TA-6 construction site, in whole or in part, would involve clearing the site of native vegetation. The TA-55 site would involve some removal of asphalt and concrete material at the construction site and removal of mostly grassy vegetation coverage with a few mature trees. The TA-6 construction site would require the removal of mature trees and shrubs as well as grassy vegetation coverage. No asphalt or concrete material are present at the proposed TA-6 construction site.

Noise at the site would occur mainly during daylight hours and would be audible primarily to the involved workers. Construction equipment would be maintained in accordance with applicable health and safety requirements and inspected on a regular basis. Workers would be required to use personal protective equipment (such as eye and hearing protection, hard hats, and steel-toed boots). Machinery guards would also be used as necessary based on activity-specific hazards analyses.

Clearing or excavation activities during site construction have the potential to generate dust and encounter previously buried materials that could include unknown potential release sites (PRS) containing hazardous, toxic, or radioactive materials, or objects of cultural significance. If buried materials or artifacts of cultural significance were encountered during construction, activities

would cease until their significance was determined and appropriate actions taken. Appropriate actions, in the case of the unexpected discovery of cultural resources, would include assessing the nature of the discovery, contacting the appropriate parties for consultation (such as the State Historic Preservation Officer and the group of individuals likely affiliated with the resource), making decisions about site data recovery, removal of the artifact or feature, or shifting construction away from the feature. Standard site dust suppression methods (such as spraying with water or use of soil tackifiers⁴) would be used onsite to minimize the generation of dust during all phases of construction activities. The New Mexico Environment Department (NMED) does not regulate dust from excavation or construction sites, but best achievable control measures (BACM) would be used to control fugitive dust and particulate emissions.

Any suspected or known PRS resulting from prior LANL activities would be evaluated to identify procedures for working within those site areas and to determine the need to remove site contamination. Contaminated soils would be removed as necessary to protect worker health or the environment before construction was initiated. Any contaminated soil removed would be either stored onsite and returned to the site as fill material or characterized and disposed of appropriately at LANL or an offsite waste management facility.

Engineering best management practices (BMP) would be implemented for each building and structure site as part of a site Storm Water Pollution Prevention (SWPP) Plan executed under a National Pollutant Discharge Elimination System (NPDES) construction permit. These BMPs could include the use of hay bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain excavated soil and surface water discharge during construction. After construction of each building and structure mounds of loose soil would be removed from the area and the site would be landscaped. The landscaping would incorporate to the maximum extent practicable a design to capture and utilize area precipitation to minimize the need for permanent watering systems. Low-pressure sprinklers could be required to supply water for the establishment of plants and grassy areas over the first year or two of growth. Plants native to the Pajarito Plateau would be used primarily where practicable. Other native New Mexico plants that require drip watering systems could be used minimally. All site revegetation would be performed in coordination with the LANL Wildfire Hazard Reduction Program and other LANL natural and cultural resource management plans under implementation at the time.

The site construction contractor would be prohibited from using chemicals that generate Resource Conservation and Recovery Act (RCRA)-regulated wastes. Non-RCRA-regulated wastes generated during construction, such as packaging and strapping material, excess gypsum board pieces, broken or bent nails and screws, and empty material containers, would be disposed of at the Los Alamos County Landfill or its replacement facility.

Parking within TA-55 would be shifted during the construction phase, and traffic flow would be altered for short periods during delivery of construction materials and by the addition of construction workers in the area. About 300 construction workers would be onsite during the

⁴Tackifiers are chemical dust suppressants often sprayed on construction sites. The chemical dust suppressants are mixed with water, which acts to disperse the chemicals and then evaporates after application. The chemicals that are left behind bind the soil particles together into larger particles that are less easily blown into the air.

peak construction period, adding about 135 vehicles to local LANL roadways during construction. These workers would park their personal vehicles at parking areas located at the edge of the construction sites at either TA-55 or TA-6.

No construction would be conducted within a floodplain or wetland. No known cultural resource areas are located within the proposed building sites. Construction activities at either the TA-6 or TA-55 sites would have the potential to affect unoccupied habitats for sensitive animals that are designated as Federally-protected threatened or endangered species under the Endangered Species Act of 1973, as amended (50 CFR 17.11). Timing of some activities and exact work commencement could, in part, be determined by the provisions of the LANL *Threatened and Endangered Species Habitat Management Plan* (HMP).

Each of the buildings and structures would be appropriately designed according to general design criteria for a new facility (DOE Order 413.3). The new CMRR Facility would be designed as a state-of-the-art facility. Consistent with DOE Order 413.3, sustainable facility designs would include features that would allow the structures to operate with improved electric and water use efficiency and would incorporate recycled and reclaimed materials into their construction. For example: the new office building (if constructed) would incorporate building and finish materials, and carpets and furnishings made of reclaimed and recycled materials, low-flow lavatory fixtures to minimize potable water use, and energy-efficient lighting fixtures and equipment to reduce electric consumption. The finished landscaping of the involved construction area would utilize captured precipitation, reused and recycled materials, and native plant species. Permanent safety and security exterior lighting at the buildings and structures, as well as along the facility's fenced boundary, would be designed so that it is directed toward the facility and away from roads and canyons as much as possible.

Utility services (including potable water, electric power, communications, sanitary waste, radioactive liquid waste, and natural gas services) are sufficient and available onsite at TA-55 to serve the new buildings and structures. Utility lines are located adjacent to the building sites at TA-55 and would require minimal trenching to connect them to the new structures. At TA-6, utility services would need to be routed over a distance to the proposed building site. Extensive trenching (approximately 1.5 acres [0.6 hectares]) would be required to connect them to the new structures. If a new radioactive liquid waste pipeline were constructed to connect TA-6 with the waste water treatment facility at TA-50, trenching of about 3 acres (1.2 hectares) would be necessary to accommodate that individual service line.

Each of the buildings constructed as part of the CMRR Facility would be appropriately designed and equipped to meet applicable facility environmental, safety, and health requirements and standards. Design features would include such items and systems as uninterruptible electric power supplies; backup diesel-powered generators; heating, ventilation and air conditioning systems with standard dust-type filters or specialty filters, including high efficiency particulate air filters (HEPA); and other facility health, safety, and security equipment as required and appropriate.

Equipment: Standard equipment used for light and heavy industrial construction activities would be used for the project. Not all construction equipment and machinery would be operating

at the same time. Equipment would be needed for excavation, trenching, earth moving, compaction, heavy and light lifting, paving, mechanical fabrication and installation, concrete forming, pumping and placement purposes, as well portable power supplies, primary and secondary electrical installation and distribution. Dump trucks, bulldozers, drill rigs, cranes, cement mixer trucks, front-end loaders, lifts, compressors, trenchers, backhoes, paving equipment, excavators, tamper compactors, welders, water trucks, pickup trucks and other similar equipment and machinery would be used. General purpose hand-held equipment used during construction of the various buildings would include hammers, nail guns, various saws and other hand-held or hand-manipulated tools. These vehicles and pieces of equipment would operate primarily during the daylight hours and would be left onsite over night. If nighttime construction activities are required, additional exterior artificial lighting would be used. Temporary construction trailers would be present at the construction sites during the construction period. A lay down area for equipment and materials would be used at the construction site; this area would be about 2 acres (0.8 hectares) in size.

A dedicated concrete batch plant with a maximum production rate of 125 cubic yards per hour (96 cubic meters per hour) would be set up and utilized to meet concrete quantity and quality requirements during construction of the nuclear laboratory elements of the CMRR project. This dedicated batch plant would require a maximum of 5 acres (2 hectares) of land at TA-55, with a maximum of 100 workers.

Materials: Construction materials for the CMRR project would include standard materials used for light and heavy industrial construction applications. The administrative offices and support functions building component of the CMRR Facility, if built, would utilize standard construction materials typically used in office and lite-laboratory construction. These materials could include concrete masonry units (CMU), gypsum board, steel studs and beams, and wooden boards and trim pieces. No specialized construction materials would be needed. For the nuclear laboratories element of the CMRR Facility, significant quantities of standard construction elements would be anticipated, specifically, concrete and steel. The main structural elements for the nuclear laboratories would probably be constructed primarily of reinforced concrete cast-in-place and solid grout-filled CMUs. The foundation system for the buildings would mostly consist of cast-in-place concrete. Some specialized concrete additives could be required during construction dependent upon final design requirements and construction scheduling yet to be determined. As noted earlier, a dedicated concrete batch plant would be used to support construction of the nuclear laboratory elements of the CMRR Facility in order to meet supply and quality assurance requirements.

An asphalt parking area of about 5 acres (2 hectares) would be constructed as part of the CMRR project. The parking area would be constructed of standard materials including asphalt and concrete.

Construction materials would be procured primarily from New Mexico suppliers. Supplies would be delivered to and stored at existing LANL storage areas or at the construction site laydown area at either at TA-55 or TA-6.

Construction Methods: Standard construction methods for light and heavy industrial construction would be used for the CMRR Facility. Construction of the administrative offices and support functions building element of the CMRR Facility would employ construction methods and techniques for standard commercial or light-industrial construction. No specialized construction methods or procedures would be anticipated. The nuclear laboratories element of the CMRR Facility is expected to require specialized construction with regards to the cast-in-place reinforced concrete. This would be accomplished with traditional reinforced concrete construction methods subject to stringent quality assurance requirements associated with nuclear facilities. Although standard, traditional construction methods would be employed, the large volumes of concrete to be placed, combined with the quality assurance requirements and the need for close integration with existing facilities and other ongoing LANL projects would require significant project management oversight.

Workers (Total and Peak): Construction workers would mostly be drawn from communities across New Mexico. The total number of workers onsite at any one time could be as great as about 300 for the CMRR Facility building(s) and parking lot construction. Estimated peak construction worker numbers are listed in Table 2–1. CMRR Facility construction elements could be sequenced. If the administrative offices and support functions building were constructed, it would be built first, followed by the nuclear laboratories building(s) after the administrative offices and support functions building construction was well underway. Construction of the administrative offices and support functions building would engage a peak construction workforce of about 150 workers. Depending on the final positioning of the nuclear laboratories element of the CMRR Facility, the construction workforce for that effort could peak at about 300 workers. The estimated peak construction workforce for the associated parking area would be about 50 workers.

Construction Schedule: As noted, the construction activities for the CMRR Facility could be sequenced, commencing with the administrative offices and support functions building, followed by the construction of the nuclear laboratories element. Construction of the administrative offices and support functions building would commence in fiscal year (FY) 2004, with completion expected in FY 2007. The total construction duration of that element of the CMRR Facility would be about 26 months. Construction of the nuclear laboratory element of the CMRR Facility would begin in about FY 2008, with completion expected in FY 2011. The total duration of that element of the CMRR Facility would be about 34 months. Completion of the administrative offices and support functions building, would allow transition of some administrative functions and support for CMRR Facility construction activities. Construction of the nuclear laboratories element would be sequenced if the final design is based on separate Hazard Category 2 and 3 buildings. Transition from the existing CMR Building would occur as new CMRR Facility buildings were completed and approved for startup and operations.

2.7.3 Project Schedule

For the purpose of the analysis in the EIS, it was estimated that construction under any of the alternatives would start late in 2004 and last approximately 5 years. The new facilities would be designed for a lifetime performance of at least 50 years; therefore, operation is projected to range

from 2010 to 2060. It is also expected that simultaneous operation of the existing CMR Building and the new CMRR Facility would last a maximum of 4 years, between about 2010 and 2014.

2.7.4 Operational Characteristics

The operational characteristics of the CMRR Facility are based on the level of operations identified by the Expanded Operations Alternative in the 1999 SWEIS for the CMR Building; the Facility's capabilities were discussed in Section 2.4 of this EIS. The CMRR Facility's operational characteristics are summarized in **Table 2–2** and briefly discussed in the following paragraphs. The operational characteristics are estimated to be the same regardless of the location of the CMRR Facility; however, as noted in the text, the particulars of some operations may differ between geographic locations. Operational administrative controls and activities (such as recycling office wastes) would be employed at the Facility that would enhance the overall LANL waste minimization effort and efforts to reduce the use of potable water and energy sources. Every effort would be made to encourage recycling and reuse of waste materials. LANL has existing recycling contracts for the following materials: metal, paper, cardboard, concrete, asphalt, wire, smoke detectors, exit signs and light bulbs.

Table 2–2 Operational Characteristics of the CMRR Facility (per year)

Electricity usage (megawatt hours)	19,272
Water usage (million gallons)	10.4
Nonradiological gaseous effluent	very small ^a
Radiological gaseous/airborne effluent (curies)	Pu-239 = 0.00076; Kr-85 = 100; Xe-131m = 45; Xe-133 = 1,500; H-3 (water vapor) = 750; and H-3 (elemental) = 250
Nonradiological liquid effluent (gallons)	530,000
Radiological liquid effluent (gallons)	10,400 ^b
Workforce	550
Worker average dose and cumulative dose	110 millirem, and 50 person-rem
Waste generation:	
Transuranic waste (cubic yards)	61
Mixed transuranic waste (cubic yards)	26.7
Low level radioactive waste (cubic yards)	2,640 ^c
Mixed low-level radioactive waste (cubic yards)	25.6
Chemical waste (RCRA/TSCA) (pounds)	24,700
Sanitary waste (million gallons)	7.15 ^d

Pu = plutonium; Kr = krypton; Xe = xenon; H-3 = tritium; RCRA = Resource Conservation and Recovery Act; TSCA = Toxic Substance Control Act

^a The amount of chemical effluent through the facility stack would be very small, well below the screening levels used to determine the need for additional analysis (DOE 1999a).

^b No direct discharge to the environment. Radiological liquid waste would be collected and transported to TA-50 for treatment.

^c Includes low-level radioactive solid waste generated by the treatment of liquid low-level radioactive wastes produced by CMRR Facility operations.

^d This estimate is based on the assumption of 550 workers generating 50 gallons per day and 260 working days per year. Source: DOE 1999a, LANL 2001b, LANL 2002e.

Infrastructure Parameters: Activities associated with operation of the CMRR Facility would not be energy- or water-use intensive. Use of potable water and electric power would represent small fractions of the sitewide energy and potable water use. Other use of nonwaste related

infrastructure utility services would be expected to remain at about the current level of use from operations at the CMR Building.

Nonradiological Gaseous Effluent: Activities in the CMRR Facility would involve use of many industrial-type nonradiological chemicals. The quantities of nonradiological chemicals at the CMRR Facility would be maintained at the minimum quantities needed for ongoing work and would not be stockpiled beyond a monthly use quantity. The potential gaseous effluent expected to result as a consequence of the use of nonradiological volatile chemicals through the facility stack would be very small. Emissions from emergency diesel generator testing and operation are included in the *CMRR EIS* environmental impacts analyses.

Radiological Gaseous Effluent: The various analytical and experimental activities at the CMRR Facility would be projected to generate the following maximum gaseous or airborne effluents annually: 0.00076 curies of airborne actinides (considered being plutonium-239 equivalent); 100 curies of krypton-85; 45 curies of xenon-131; 1,500 curies of xenon-133; and 1,000 curies of tritium (750 curies in oxide [as water vapor HTO] form, and 250 curies as gas [T₂] form).

Nonradiological Liquid Effluent: It is estimated the CMRR Facility operations and supporting systems would generate the same level of nonradiological liquid effluent discharge as the CMR Building. The CMR Building discharges nonradiological liquid effluent seasonally at a rate of 1 gallon per minute, or about 530,000 gallons per year (2 million liters per year) through a single NPDES outfall.

Radiological Liquid Effluent: Activities at the CMRR Facility would generate radioactive wastes. If the CMRR Facility is located at TA-55, these wastes would be collected and discharged into a network of drains that would route the solutions to the RLWTF at TA-50 for treatment and disposal. If located at TA-6, these waters would be collected and either transported to the RLWTF by tanker trucks or by a newly constructed pipeline connecting the TA-6 CMRR Facility site to the TA-50 RLWTF through a tie-in to existing RLWTF waste lines present either at TA-3 or at TA-59. The treatment process at the RLWTF includes ultrafiltration and reverse osmosis that, in total, remove particulate materials as small as one nanometer (10⁻⁹ meters) in size. The current CMR Building's radiological liquid effluent rate is not monitored, so information about the exact rate of production of this effluent type is unknown.

Radioactive Waste Generation: Activities at the CMRR Facility would generate radioactive wastes, including those disposed of as transuranic waste, low-level waste and mixed waste. The annual radioactive waste generation rates include 61 cubic yards (46.6 cubic meters) of transuranic waste; 26.7 cubic yards (20.4 cubic meters) of mixed transuranic waste; 2,433 cubic yards (1,860 cubic meters) of low-level radioactive waste; 25.6 cubic yards (19.6 cubic meters) of mixed low-level radioactive waste.

Chemical Waste Generation: Operations at the CMRR Facility would generate 24,692 pounds (11,200 kilograms) of chemical waste annually.

Sanitary Waste Generation: It is estimated the operations and personnel at the CMRR Facility would produce about 7.15 million gallons (27 million liters) of sanitary waste⁵ annually.

Workforce: The operational workforce at the CMRR Facility would be about 550 people. If either of the Hybrid Alternatives were implemented, this workforce would be separated between TA-3, the existing CMR Building, and either TA-55 or TA-6. Work would typically be conducted over a 40-hour equivalent work week during daytime hours.

Worker Dose: The estimated worker doses are based on historical exposure data for LANL workers (*DOE Worker Occupational Exposure Annual Report for 2000*). Based on the reported data, the average annual dose to a LANL worker who received a measurable dose was 104 millirem. A value of 110 millirem has been used as the estimate of the average annual worker dose per year of operation at the new CMRR Facility.

2.7.5 Transportation

Radioactive and SNM shipments would be conducted within the LANL site. Transport distances would vary across alternatives, from a very short distance, [about 100 to 300 feet (30 to 90 meters)] in Alternative 1 (Preferred Alternative at TA-55), to about 3 to 5 miles (5 to 8 kilometers) in Alternative 2, at TA-6. Movement of materials outside TA-55 would occur on NNSA-controlled roads. DOE procedures and U.S. Nuclear Regulatory Commission regulations would not require the use of certified Type B casks within DOE sites. However, DOE procedures require closing the roads and stopping traffic for shipment of material (fissile or SNM) in noncertified packages. Shipment using certified packages, or smaller quantities of radioactive materials and SNM could be performed while site roads are open. As part of current security implementation at LANL, the roads to be used to transport the radioactive and SNM materials would have limited public access capabilities.

Material transport under the proposed action would include a one-time transport of some or all of the equipment at the CMR Building to the new CMRR Facility at TA-55 or TA-6. This movement would occur over a period of 2 to 4 years over open or closed roads.

2.7.6 Accident Analysis

A core set of accident scenarios was selected for analysis in the *CMRR EIS*. The impacts of the accidents analyzed for each alternative reflect and bound the impacts of all reasonably foreseeable accidents that could occur if the alternative were implemented. More details on accident scenarios and assumptions used in the evaluation of human health impacts from facility accidents are presented in Appendix C.

⁵ This estimate is based on the annual sanitary waste production rate for 550 workers, each generating about 50 gallons (189 liters) per day of sanitary waste over 260 working days per year.

2.7.7 Disposition of the CMR Building

The disposition options for the existing CMR Building include:

Disposition Option 1: Reuse of the Building for administrative and other activities appropriate to the physical conditions of the structure with the performance of necessary structural and systems upgrades and repairs.

Disposition Option 2: Decontamination, decommission, and demolition of selected parts of the existing CMR Building, with some portions of the Building being reused.

Disposition Option 3: Decontamination, decommission, and demolition of the entire existing CMR Building.

Over the past 50 years of operation, certain areas within the existing CMR Building, pieces of equipment, and building systems have become contaminated with radioactive material and by operations involving SNM. These areas include about 3,100 square feet (290 square meters) of contaminated conveyors, gloveboxes, hoods and other equipment items; 760 cubic feet (20 cubic meters) of contaminated ducts; 580 square feet (50 square meters) of contaminated hot cell floor space; and 40,320 square feet (3,750 square meters) of laboratory floor space.

At this time, the existing CMR Building has not been completely characterized with regard to types and locations of contamination. In addition, project-specific work plans have not been prepared that would define the actual methods, timing, or workforce to be used for the decontamination and demolition of the Building. Instead, general or typical methods of decontamination and demolition are presented in general terms below. Additional NEPA compliance review would be required when the specific features of the disposition of the CMR Building actually become mature for decision in about 15 years.

2.7.7.1 Decontamination and Demolition Process

The process that would be used to decontaminate and demolish the CMR Building is described in the text box in Section 2.9.1. Detailed project-specific work plans for the decontamination and demolition of the CMR Building would be developed and approved by NNSA before any actual work began. These plans would include those required for environmental compliance (such as an SWPP Plan) and monitoring activities (such as using a real-time gamma radiation monitor); all necessary legal and regulatory requirements in effect at the time would be undertaken before any decontamination or demolition activities were conducted. Some of the disposition work could involve technologies and equipment that have been used in similar operations, and some could use newly developed technologies and equipment. It is not likely that all of the decontamination and demolition work elements described in the following discussion would be utilized. All work would be carefully planned in accordance with established state and Federal laws and regulations (such as National Emissions Standards for Hazardous Air Pollutants [NESHAP]), DOE Orders, and LANL procedures and BMPs.

The decontamination and demolition work is estimated to require up to one million person-hours. At any given time, a workforce from 2 to 100 or more workers could be onsite (LANL 2003). The DOE and LANL limit for worker exposure is 5 rem per year (10 CFR 835).

2.7.7.2 CMR Building Decontamination

The CMR Building consists of three levels, each essentially covering the full footprint of the structure. Radioactive contamination in the CMR Building is known or suspected in quantities that could require some level of decontamination or control for continued use or to control the spread of contamination during demolition. The three building levels include:

- **Attic**—Contains primarily facility equipment and is expected to be mostly free of radioactive contamination.
- **Main Floor**—Most of the CMR Building's laboratory and office space is on this level. The ceilings are expected to be mostly clean, with increasing potential for contamination toward the floor. It is estimated that 45 percent of the items and surfaces at this level are contaminated to some degree.
- **Basement**—Contains facility equipment, and has the highest potential for contamination. The ventilation ducts and piping in this area are on the contaminated side of the process flow, and it is expected that some contamination would migrate down into the basement. It is assumed that all equipment and surfaces in the basement are contaminated to some degree.

The CMR Building (except for Wing 9) is constructed of reinforced concrete floors (typically 4 inches [10 centimeters] thick), reinforced concrete walls (18 inches [46 centimeters] thick), reinforced concrete frame, and steel framing with a light-gauge metal deck roof. The entire facility is supported on reinforced concrete basement walls and columns on spread footings. Wing 9 is constructed differently with the above-grade walls consisting of lightly reinforced concrete masonry walls. The floor and grade slabs are thicker (approximately 11 inches [28 centimeters]), and the footings and concrete around and under the hot cells are massive (LANL 2003).

The overall footprint is estimated to be 195,000 square feet (18,116 square meters) and the average height from the bottom of the basement slab to the top of the roof is 50 feet (15 meters). The total volume of the Building is estimated to be 360,000 cubic yards (275,242 cubic meters) (LANL 2003).

Ventilation System: The exhaust side of the ventilation system is large and highly contaminated. Most of the contaminated ductwork is in the basement.

Radioactive Liquid Waste Line: The radioactive liquid waste system carries contaminated wastewater to the RLWTF at TA-50. This is a highly contaminated system and, due to leakage, is thought to be the largest contributing source of contamination within the CMR Building. It has been estimated that the radioactive liquid waste line consists of approximately 9,200 feet (2,804 meters) of 5-inch- (13-centimeter-) diameter and 16,100 feet (4,907 meters) of 2.5-inch-

(6-centimeter-) diameter stainless steel pipe. It is expected that the bulk of this piping would be transuranic waste, with some portions being mixed low-level radioactive waste due to mercury contamination. Also, in areas of leakage, surrounding concrete, walls, floors, and other adjacent surfaces there may be higher levels of contamination (LANL 2003).

Vacuum Systems: Of the two large vacuum systems in the CMR Building, one is highly contaminated. The second newer system is expected to have only low levels of contamination.

Walls: Leaks from the radioactive liquid waste line have resulted in contamination within the walls. It has been estimated that 432,000 square feet (40,134 square meters) would have to be replaced to achieve a level of decontamination adequate for reuse of the space for operations (LANL 2003).

Floors: Floor contamination is widespread and ranges from low to high levels. The basement floors have many areas of contamination, some of which have been painted over. Floor contamination in the attic is limited.

Asbestos: Approximately 73,000 feet (22,250 meters) of asbestos pipe insulation has been found in the CMR Building, with another 9,400 square feet (873 square meters) on ducts. Floor tile (up to 20,000 square feet [1,858 square meters]) and ceiling tile may also contain asbestos (LANL 2003).

Decontamination of the CMR Building would consist of the removal of nonradiological and radiological contamination from the building using vacuum blasting, sand blasting, carbon dioxide bead blasting, scabbling, and mechanical separation of radioactive and nonradioactive materials. This would include removal of flooring, ceiling tiles, insulation, and paint contaminated with asbestos, lead, and other toxic-contaminated materials. Some of these materials may also be contaminated with radionuclides and require special handling. Radiologically contaminated and uncontaminated debris would be segregated. The extent of decontamination performed would be limited to those activities required to minimize radiological and hazardous material exposure to workers, the public, and the environment.

Decontamination of the CMR Building would also include the removal of asbestos debris. About 50 percent of the asbestos debris is anticipated to be free of radiological contamination. The other 50 percent of the asbestos debris is expected to be radiologically contaminated and would require special handling.

Air emissions generated during asbestos removal would be controlled by tents enclosing highly contaminated areas and using high-efficiency particulate air-filtered collection devices to collect asbestos dust particles. Dust suppression techniques would also be used to ensure that particulate emissions are kept to a minimum. Asbestos decontamination workers would be protected by personal protective equipment and other engineering and administrative controls.

Worker exposure to ionizing radiation would be controlled to limit any individual's dose to less than 1 rem per year. Where practical, shielding and remotely operated equipment would be used to reduce radiation levels at worker locations.

2.7.7.3 Demolition of the CMR Building

Once the CMR Building has been decontaminated, demolition could proceed. All demolition debris would be sent to appropriate disposal sites. The CMR Building is not expected to be technically difficult to demolish and waste debris would be handled, transported, and disposed of in accordance with standard LANL procedures.

Demolition of uncontaminated portions of the Building would be performed using standard industry practices. A post-demolition site survey would be performed in accordance with the requirements of the *Nuclear Regulatory Commission Manual for Conducting Radiation Surveys* (NUREG/CR-5849).

2.7.7.4 Waste Management and Pollution Prevention Techniques

Waste management and pollution prevention techniques that could be implemented during the demolition of the CMR Building would include:

- Conducting routine briefings of workers;
- Segregating wastes at the point of generation to avoid mixing and cross-contamination;
- Decontaminating and reusing equipment and supplies;
- Removing surface contamination from items before discarding;
- Avoiding use of organic solvents during decontamination;
- Using drip, spray, squirt bottles or portable tanks for decontamination rinses;
- Using impermeable materials such as plastic liners or mats and drip pallets to prevent the spread of contamination;
- Avoiding areas of contamination until they are due for decontamination;
- Reducing waste volumes (by such methods as compaction); and
- Engaging in the use of recycling actions (materials such as lead, scrap metals, and stainless steel could be recycled to the extent practical).

Some of the wastes generated from the decontamination and demolition of the CMR Building would be considered residual radioactive material. DOE Order 5400.5 establishes guidelines, procedures, and requirements to enable the reuse, recycle, or release of materials that are below established limits. Materials that are below these limits are acceptable for use without restrictions. The residual radioactive material that would be generated by the decontamination and demolition of the CMR Building would include uncontaminated concrete, soil, steel, lead, roofing material, wood, and fiberglass. The concrete material could be crushed and used as backfill at LANL. Soil could also be used as backfill or as topsoil cover, depending on their characteristics. Steel and lead could be stored and reused or recycled at LANL. Wood, fiberglass, and roofing materials would be disposed at the Los Alamos County Landfill or its replacement facility. The total amount of waste generated from the disposition of the CMR Building is anticipated to be 36,000 cubic yards (27,500 cubic meters); this estimate does not include the amount of waste generated by the demolition of the outbuildings, parking lots, or soil removal. The total volume of solid waste, and recyclable materials generated from the disposition of the CMR Building is estimated at 20,000 cubic yards (15,300 cubic meters).

Decontamination and Demolition Work Elements

Characterization, Segregation of Work Areas, and Structural Evaluation: Walls, floors, ceilings, roof, equipment, ductwork, plumbing, and other building and site elements would be tested to determine the type and extent of contamination present. The CMR Building would then be segregated into areas of contamination and noncontamination. Contaminated areas would be further subdivided by the type of contamination: radioactive materials, hazardous materials, toxic materials including asbestos, and any other RCRA listed or characteristic contamination. As part of the characterization and segregation of work areas, consideration would also be given to the structural integrity of the CMR Building. Some areas could require demolition work prior to decontamination.

Removal of Contamination: Workers would remove or stabilize contamination according to the type and condition of materials. If the surface of a wall was found to be contaminated, it might be physically stripped off. If contamination was found within a wall, a surface coating might be applied to keep the contamination from releasing contaminated dust during dismantlement and to keep the surface intact.

Demolition of the CMR Building, Foundation, and Parking Lot: After contaminated materials have been removed, wherever possible and practical, the demolition of all or portions of the CMR Building would begin. Demolition could involve simply knocking down the structure and breaking up any large pieces. Knocking down portions of the CMR Building, foundation, and parking lot could require the use of backhoes, front-end loaders, bulldozers, wrecking balls, shears, sledge and mechanized jack hammers, cutting torches, saws, and drills. If not contaminated, demolition material could be reused onsite at LANL or disposed of as construction waste onsite or offsite. Asphalt would be placed in containers and trucked to established storage sites within LANL, at TA-59 on Sigma Mesa.

Segregating, Packaging, and Transport of Debris: Demolition debris from the CMR Building would be segregated and characterized by size, type of contamination, and ultimate disposition. Debris that is still radiologically contaminated would be segregated as low-level radioactive waste if no hazardous¹ contamination is present. Radiologically-contaminated and non-contaminated asbestos debris would also be segregated separately. Other types of debris that would be segregated include mixed low-level radioactive waste,² noncontaminated construction debris, and debris requiring special handling. Segregation activities could be conducted on a gross scale using heavy machinery or could be done on a smaller scale using hand-held tools. Segregated waste would be packaged as appropriate and stored temporarily pending transport to an appropriate onsite or offsite disposal facility.

Debris would be packaged for transport and disposal according to waste type, characterization, ultimate disposition, and U.S. Department of Transportation (DOT) or DOE transportation requirements. Uncontaminated construction debris could be sent unpackaged to the local landfill by truck. Demolition debris would also be recycled or reused to the extent practicable. Debris would be disposed of either on or offsite depending on the available capacity of existing disposal facilities. Offsite disposal would involve greater transportation requirements depending on the type of waste, packaging, acceptance criteria, and location of the receiving facility.

Testing and Cleanup of Soil and Contouring and Seeding: The soils beneath the CMR Building would be sampled and tested for contamination. Any contaminated soil would undergo cleanup per applicable environmental regulations and permit requirements and would be packaged and transported to the appropriate disposal facility depending on the type and concentration of contamination. After clean fill and soil were brought to the site as needed, the site would be contoured. Contouring would be designed to minimize erosion and replicate or blend in with the surrounding environment. Subsequent seeding activities would utilize native plant seeds and the seeds of non-native cereal grains selected to hold the soil in place until native vegetation becomes stabilized.

¹ Hazardous waste is a category of waste regulated under the RCRA. Hazardous RCRA waste must be solid and exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the U.S. Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

² Mixed low-level radioactive waste contains both hazardous RCRA waste and source, special nuclear, or byproduct material subject to the Atomic Energy Act.

(LANL 2003). The volume of radioactive waste generated from the disposition of the CMR Building is estimated to be 16,000 cubic yards (12,200 cubic meters).

Asbestos that is not radiologically contaminated would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL.

Radioactive contaminated soil, concrete, walls, and tiles would be packaged as low-level radioactive wastes and disposed of at TA-54, Area G, or an offsite commercial facility. Gloveboxes and radioactive liquid waste lines categorized as transuranic waste would be disposed at the Waste Isolation Pilot Plant (WIPP).

If any other RCRA-regulated hazardous wastes were generated by disposition activities, they would be handled, packaged, and disposed of according to LANL's hazardous waste management program. Hazardous wastes would be stored at TA-54, Area L, at LANL until sufficient quantities are accumulated for shipment to offsite treatment, storage, and disposal facilities. Any hazardous waste generated by the demolition of the CMR Building would be transferred to an appropriate offsite facility for disposal. All offsite shipments would be transported by a properly licensed and permitted shipper and conducted in compliance with U.S. Department of Transportation (DOT) regulations and DOE standards.

2.7.8 Disposition of the CMRR Facility

Disposition of the new CMRR Facility would be considered at the end of its designed lifetime operation of at least 50 years. It is anticipated that the impacts from the disposition of the CMRR Facility would be similar to those discussed for the disposition of the existing CMR Building.

2.8 THE PREFERRED ALTERNATIVE

CEQ regulations require an agency to identify its preferred alternative, if one or more exists, in the final EIS [40 CFR 1502.14(e)]. The Preferred Alternative is the alternative that the agency believes would fulfill its statutory mission, giving consideration to environmental, economic, technical, and other factors. Alternative 1 (construct a new CMRR Facility at TA-55), is NNSA's Preferred Alternative for the replacement of the CMR capabilities. NNSA has identified as its preferred construction option the construction of a single consolidated SNM-capable Hazard Category 2 laboratory with a separate administrative offices and support functions building (Construction Option 3). NNSA's preferred option for the disposition of the CMR Building is to decontaminate, decommission and demolish the entire structure (Disposition Option 3).

2.9 SUMMARY OF ENVIRONMENTAL CONSEQUENCES FOR THE CMR BUILDING REPLACEMENT PROJECT

This section comparatively summarizes the alternatives analyzed in this EIS in terms of their expected environmental impacts and other possible decision factors. The following subsections summarize the environmental consequences and risks by construction and operations impacts for

each alternative. In addition, environmental impacts common to all alternatives are also summarized. These include transportation risks and CMR Building and CMRR Facility disposition impacts.

Table 2–3 presents a comparison of the environmental impacts for each of the alternatives discussed in detail in Chapter 4, including facility construction and operations impacts. For the most part, environmental impacts would be small and would be similar among the alternatives analyzed.

2.9.1 Construction Impacts

In evaluating construction impacts, Construction Option 1 was considered to be the option that would bound the potential environmental impacts from construction activities. The results in Table 2–3, therefore, represent Construction Option 1 for all alternatives.

No Action Alternative: Under the No Action Alternative, there would be no new construction and minimal necessary structural and systems upgrades and repairs. Accordingly, there would be no environmental impacts resulting from construction for this alternative.

Alternative 1 (Preferred Alternative): The construction of new Hazard Category 2 and 3 buildings, the construction of an administrative offices and support functions building, SNM vaults and other utility and security structures, and a parking lot at TA-55 would affect 26.75 acres (10.8 hectares) of mostly disturbed land and would not change the area's current land use designation. The existing infrastructure resources (natural gas, water, electricity) would adequately support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. Construction activities would not impact water, visual resources, geology and soils, or cultural and paleontological resources. Minor indirect effects to Mexican spotted owl habitat could result from the removal of a small amount of habitat area, increased site activities, and night-time lighting near the remaining Mexican spotted owl habitat areas. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the socioeconomic region of influence. Waste generated during construction would be adequately managed by the existing LANL capacity for handling waste.

Alternative 2 (Greenfield Alternative): The construction of new Hazard Category 2 and 3 buildings, the construction of an administrative offices and support functions building, SNM vaults and other utility and security structures, and a parking lot at TA-6 would affect 26.75 acres (10.8 hectares) of undisturbed land, and would change the area's current land use designation to nuclear material research and development, similar to that of TA-55. Infrastructure resources (natural gas, water, electricity) would need to be extended or expanded to TA-6 to support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. Construction would also alter the existing visual character of the central portion of TA-6 from that of a largely natural woodland to an industrial site. Once completed, the new CMRR Facility would change the Visual Resource Contrast Rating of TA-6 from Class III to

Class IV. Construction activities would not impact water, biotic resources (including threatened and endangered species), geology and soils, or cultural and paleontological resources. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL capacity for handling waste. In addition, a radioactive liquid waste pipeline might also be constructed across Two-Mile Canyon to tie in with an existing pipeline to the RLWTF at TA-50.

Alternative 3 (Hybrid Alternative at TA-55): The construction of new Hazard Category 2 and 3 buildings, the construction of SNM vaults and utility and security structures, and a parking lot at TA-55 would affect 22.75 acres (9.2 hectares) of disturbed land, and would not change the area's current land use designation. The existing infrastructure resources (natural gas, water electricity) would adequately support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. Construction activities would not impact water, visual resources, geology and soils, or cultural and paleontological resources. Minor indirect effects on Mexican spotted owl habitat could result from the removal of a small amount of habitat area, increased site activities, and night-time lighting near the remaining Mexican spotted owl habitat areas. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL capacity for handling waste.

Alternative 4 (Hybrid Alternative at TA-6): The construction of new Hazard Category 2 and 3 buildings, the construction of SNM vaults and utility and security structures, and a parking lot at TA-6 would affect 22.75 acres (9.2 hectares) of undisturbed land, and would change the area's current land use designation to nuclear material research and development, similar to that of TA-55. Infrastructure resources (natural gas, water, electricity) would need to be extended or expanded at TA-6 to support construction activities. Construction activities would result in temporary increases in air quality impacts, but resulting criteria pollutant concentrations would be below ambient air quality standards. It would alter the existing visual character of the central portion of TA-6 from that of a largely natural woodland to an industrial site. Once completed, the new CMRR Facility would change the Visual Resource Contrast Rating of TA-6 from Class III to Class IV. Construction activities would not impact water, biotic resources (including threatened and endangered species), geology and soils, or cultural and paleontological resources. The socioeconomic impacts associated with construction would not cause any major changes to employment, housing, or public finance in the region of influence. Waste generated during construction would be adequately managed by the existing LANL capacity for handling waste. In addition, a radioactive liquid waste pipeline might also be constructed across Two-Mile Canyon to tie in with an existing pipeline to the RLWTF at TA-50.

2.9.2 Operations Impacts

Relocating CMR operations to either TA-55 or TA-6 at LANL would require similar facilities, infrastructure support procedures, resources, and numbers of workers during operations. For most environmental areas of concern, differences would be minor. There would be no

perceivable differences in impacts between the alternatives for land use and visual resources, air and water quality, biotic resources (including threatened and endangered species), geology and soils, cultural and paleontological resources, power usage, and socioeconomics. Additionally, the new CMRR Facility would use existing waste management facilities to treat, store, and dispose of waste materials generated by CMR operations. All impacts would be within regulated limits and would comply with Federal, state, and local laws and regulations. Any transuranic waste generated by CMRR Facility operations would be treated and packaged in accordance with the WIPP Waste Acceptance Criteria and transported to WIPP or a similar type facility for DOE disposition.

Normal operations for each of the action alternatives would increase the amount of radiological releases as compared to current CMR Building operations. Current operations at the CMR Building are restricted, and do not support the levels of activity described for the Expanded Operations Alternative in the *LANL SWEIS*. There would be small differences in potential radiological impacts to the public, depending on the location of the new CMRR Facility. However, radiation exposure to the public would be small and well below regulatory limits and limits imposed by DOE Orders. The maximally exposed offsite individual would receive a dose of less than or equal to 0.3 millirem per year, which translates to 1.8×10^{-7} latent cancer fatalities per year from normal operational activities at the new CMRR Facility. Statistically, this translates into a risk of one chance in five million of a fatal cancer for the maximally exposed offsite individual due to these operations. The total dose to the population within 50 miles (80 kilometers) would be a maximum of 2.0 person-rem per year, which translates to 0.0012 latent cancer fatalities per year in the entire population from normal operations at the new CMRR Facility. Statistically, this would equate to a chance of one additional fatal cancer among the exposed population in every 1,000 years.

Using DOE-approved computer models and analysis techniques, estimates were made of worker and public health and safety risks that could result from potential accidents for each alternative. For all CMRR Facility alternatives, the results indicate that there would statistically be no chance of a latent cancer fatality for a worker or member of the public. The CMRR Facility accident with the highest risk is a facility-wide spill of radioactive material caused by a severe earthquake that exceeds the design capability of the CMRR Facility under Alternative 1. The risk for the entire population for this accident was estimated to be 0.0005 latent cancer fatalities per year. This is statistically equivalent to stating that there would be no chance of a latent cancer fatality for an average individual in the population during the lifetime of the facility. Continued operation of the CMR Building under the No Action Alternative would carry a higher risk because of the building's location and greater vulnerability to earthquakes. The risk for the entire population associated with an earthquake at the CMR building would be 0.0024 latent cancer fatalities per year, which is also statistically equivalent to no chance of a latent cancer fatality for an average individual during the lifetime of the facility.

2.9.3 Environmental Impacts Common to All Alternatives

As previously noted, overall CMR operational characteristics at LANL would not change regardless of the ultimate location of the replacement facility and the alternative implemented. Sampling methods and mission operations in support of AC and MC would not change and,

therefore, would not result in any additional environmental or health and safety impacts to LANL. Each of the alternatives would generally have the same amount of operational impacts. In other words, all of the alternatives would produce equivalent levels of emissions and radioactive releases into the environment, infrastructure requirements would be the same, and each alternative would generate the same amount of radioactive and nonradioactive waste, regardless of the ultimate location of the new CMRR Facility at LANL.

Other impacts that would be common to each of the action alternatives include transportation impacts and CMR Building and CMRR Facility disposition impacts. Transportation impacts could result from: (1) the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR Building to the new CMRR Facility; and (2) the routine onsite shipment of AC and MC samples between the Plutonium Facility at TA-55 and the new CMRR Facility. Impacts from the disposition of the existing CMR Building and CMRR Facility would result from the decontamination and demolition of the Building and the transport and disposal of radiological and nonradiological waste materials.

Transportation Risks

All alternatives except the No Action Alternative, would require the relocation and one-time transport of SNM equipment and materials. Transport of SNM, equipment, and other materials currently located at CMR Building to the new CMRR Facility at TA-55 or TA-6 would occur over a period of 2 to 4 years. The public would not be expected to receive any measurable exposure from the one-time movement of radiological materials associated with this action. Impacts of potential handling and transport accidents during the one-time movement of SNM, equipment, and other materials during the transition from the existing CMR Building to the new CMRR Facility would be bounded by other facility accidents for each alternative. For all alternatives, the environmental impacts and potential risks of transportation would be small.

Under each alternative, routine onsite shipments of AC and MC samples consisting of small quantities of radioactive materials and SNM samples would be shipped from the Plutonium Facility at TA-55 to the new CMRR Facility at either TA-55 or TA-6. The public would not be expected to receive any additional measurable exposure from the normal movement of small quantities of radioactive materials and SNM samples between these facilities. The potential risk to a maximally exposed individual member of the public from a transportation accident involving routine onsite shipments of AC and MC samples between the Plutonium Facility and CMRR Facility was estimated to be very small (9.0×10^{-8}). For all alternatives, the overall environmental impacts and potential risks of transporting AC and MC samples would be small.

Impacts During the Transition from the CMR Building to the New CMRR Facility

During a 4-year transition period, CMR operations at the existing CMR Building would be moved to the new CMRR Facility. During this time both CMR facilities would be operating, although at reduced levels. At the existing CMR Building, where restrictions would remain in effect, operations would decrease as CMR operations move to the new CMRR Facility. At the new CMRR Facility, levels of CMR operations would increase as the facility becomes fully operational. In addition, the transport of routine onsite shipment of AC and MC samples would

continue to take place while both facilities are operating. With both facilities operating at reduced levels at the same time, the combined demand for electricity, water, and manpower to support transition activities during this period may be higher than what would be required by the separate facilities. Nevertheless, the combined total impacts during this transition phase from both these facilities would be expected to be less than the impacts attributed to the Expanded Operations Alternative and the level of CMR operations analyzed in the *LANL SWEIS*.

Also during the transition phase, the risk of accidents would change at both the existing CMR Building and the new CMRR Facility. At the existing CMR Building, the radiological material at risk and associated operations and storage would decline as material and equipment are transferred to the new CMRR Facility. This would have the positive effect of reducing the risk of accidents at the CMR Building. Conversely, at the new CMRR Facility, as the amount of radioactive material at risk and associated operations increases to full operations, the risk of accidents would also increase. However, the improvements in design and technology at the new CMRR Facility would also have a positive effect of reducing overall accident risks when compared to the accident risks at the existing CMR Building. The expected net effect of both of these facilities operating at the same time during the transition period would be for the risk of accidents to be lower than the accident risks at either the existing CMR Building or the fully operational new CMRR Facility.

CMR Building and CMRR Facility Disposition Impacts

All action alternatives would require some level of decontamination and demolition of the existing CMR Building. Operational experience at the CMR Building indicates some surface contamination has resulted from the conduct of various activities over the last 50 years. Impacts associated with decontamination and demolition of the CMR Building are expected to be limited to the creation of waste within LANL site waste management capabilities. This would not be a discriminating factor among the alternatives.

Decontamination and demolition of the new CMRR Facility would also be considered at the end of its designed lifetime operation of at least 50 years. Impacts from the disposition of the CMRR Facility would be expected to be similar to those for the existing CMR Building.

Table 2–3 Summary of Environmental Consequences for the CMR Replacement Project

Table 2-5 Summary of Environmental Consequences for the CMR Replacement Project										
Resource/Material Categories	No Action Alternative		Alternative 1 (relocate CMR AC and MC operations to TA-55) ^a		Alternative 2 (relocate CMR AC and MC operations to TA-6) ^a		Alternative 3 (relocate CMR AC and MC operations to TA-55) ^b		Alternative 4 (relocate CMR AC and MC operations to TA-6) ^b	
Land Resources										
Construction ^{c/} Operations ^d	No impact		26.75 acres/ 13.75 acres		26.75 acres/ 15.25 acres		22.75 acres/ 9.75 acres		22.75 acres/ 11.25 acres	
Air Quality										
Construction ^c	No impact		Small temporary impact		Small temporary impact		Small temporary impact		Small temporary impact	
Operations	0.00003 curies of actinides		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases		- 0.00076 curies of actinides - 2,645 curies of tritium and noble fission gases	
Water Resources										
Construction ^c	No impact		Small temporary impact		Small temporary impact		Small temporary impact		Small temporary impact	
Operations	Small impact		Small impact		Small impact		Small impact		Small impact	
Ecological Resources										
Construction ^c	No impact		Indirect effect on Mexican spotted owl habitat		No impact		Indirect effect on Mexican spotted owl habitat		No impact	
Operations	No impact		Indirect effect on Mexican spotted owl habitat		No impact		Indirect effect on Mexican spotted owl habitat		No impact	
Socioeconomics										
Construction ^c	No impact		No noticeable changes; 300 workers (peak) 1,152 jobs		No noticeable changes; 300 workers (peak), 1,152 jobs		No noticeable changes; 300 workers (peak), 1,152 jobs		No noticeable changes; 300 workers (peak), 1,152 jobs	
Operations	No impact		No increase in workforce ^e		No increase in workforce ^e		No increase in workforce ^e		No increase in workforce ^e	
Public and Occupational Health and Safety										
Normal Operations	Dose	LCF	Dose	LCF	Dose	LCF	Dose	LCF	Dose	LCF
Population dose (person-rem per year)	0.04	0.000024	1.9	0.0011	2.0	0.0012	1.9	0.0011	2.0	0.0012
MEI (millirem per year)	0.006	3.5 × 10 ⁻⁹	0.33	2.0 × 10 ⁻⁷	0.35	2.1 × 10 ⁻⁷	0.33	2.0 × 10 ⁻⁷	0.35	2.1 × 10 ⁻⁷
Average individual dose (millirem per year)	0.0001	7.9 × 10 ⁻¹¹	0.006	3.8 × 10 ⁻⁹	0.006	4.0 × 10 ⁻⁹	0.006	3.8 × 10 ⁻⁹	0.006	4.0 × 10 ⁻⁹
Total worker dose (person-rem per year)	22	0.013	61	0.04	61	0.04	61	0.04	61	0.04
Average worker dose (millirem per year)	110	0.00007	110	0.00007	110	0.00007	110	0.00007	110	0.00007
Hazardous chemicals	None		None		None		None		None	

<i>Resource/Material Categories</i>	<i>No Action Alternative</i>	<i>Alternative 1 (relocate CMR AC and MC operations to TA-55) ^a</i>	<i>Alternative 2 (relocate CMR AC and MC operations to TA-6) ^a</i>	<i>Alternative 3 (relocate CMR AC and MC operations to TA-55) ^b</i>	<i>Alternative 4 (relocate CMR AC and MC operations to TA-6) ^b</i>
Accidents (Maximum Annual Cancer Risk, LCF)					
Population	0.0024	0.0005	0.00048	0.0005	0.00048
MEI	4.3×10^{-6}	1.5×10^{-6}	3.3×10^{-7}	1.5×10^{-6}	3.3×10^{-7}
Noninvolved worker	0.00019	5.0×10^{-6}	0.000054	5.0×10^{-6}	0.000054
Environmental Justice	No disproportionately high and adverse impacts on minority or low-income populations				
Waste Management (cubic yards of solid waste per year unless otherwise indicated): Waste would be disposed of properly with small impact.					
Transuranic waste	19.5	61	61	61	61
Mixed Transuranic waste	8.5	27	27	27	27
Low-level ^f radioactive waste	1,217	2,640	2,640	2,640	2,640
Mixed low-level radioactive waste	6.7	26	26	26	26
Hazardous waste (pounds per year)	10,494	24,692	24,692	24,692	24,692
Transportation					
Accidents ^g	Dose	Dose	Dose	Dose	Dose
MEI (rem per year)	7.7×10^{-7}	0	0.00015	0	0.00015

LCF = latent cancer fatality; MEI = maximally exposed individual member of the public.

^a Relocate CMR AC and MC and actinide research and development activities to a new CMRR Facility consisting of an administrative offices and support functions building and Hazard Category 2 and 3 buildings.

^b Relocate CMR AC and MC and actinide research and development activities to a new CMRR Facility consisting of only Hazard Category 2 and 3 buildings.

^c Construction impacts are based on Construction Option 1, which is bounding.

^d Acreage reflects building footprints, parking lot, and new roads as applicable.

^e CMR operations would require no additional workers beyond what was projected by the Expanded Operations Alternative analyzed in the *LANL SWEIS*. Increased CMRR Facility operations at LANL would require up to 550 workers. This would be an increase of 346 workers over current requirements. The Expanded Operations Alternative presented in the *LANL SWEIS* addressed the impact of this increase in employment.

^f Volumes of low-level radioactive waste includes solid waste generated by the treatment of liquid low-level radioactive waste generated by CMR operations.

^g Population transportation impacts would be bounded by the normal operation and accident impacts evaluated for the various alternatives.